

Appendix A

RF Test Data for BT V5.0(BDR/EDR) (Conducted Measurement)

Product Name: MEE audio X20 Truly Wireless Earphones

Trade Mark: MEE audio

Test Model: X20

Environmental Conditions

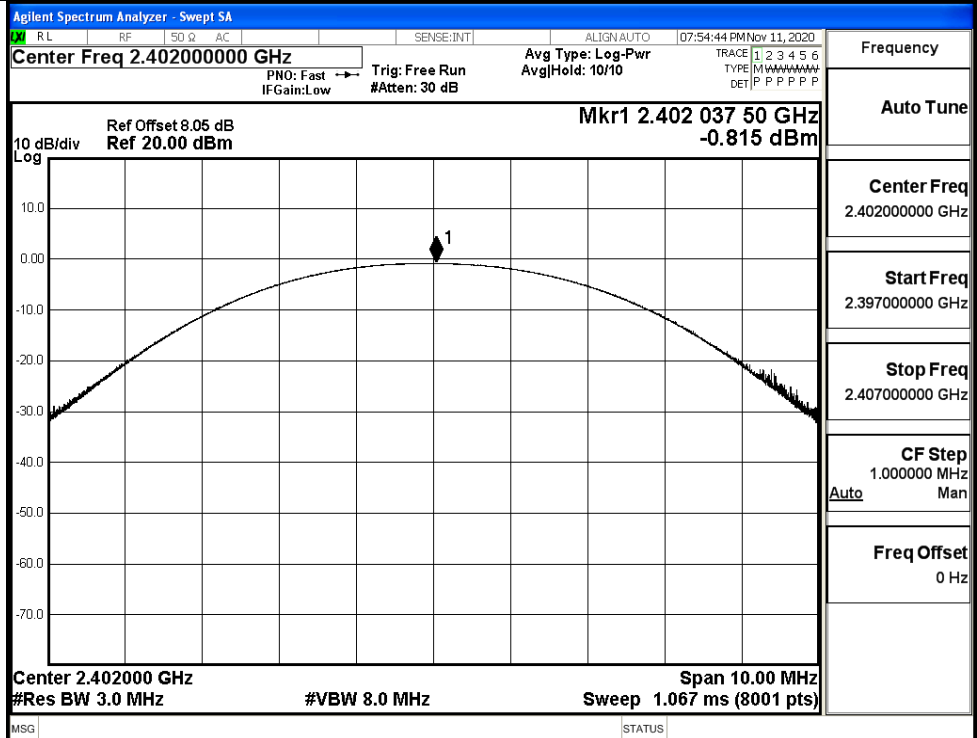
Temperature:	22.5°C
Relative Humidity:	51.8%
ATM Pressure:	100.0 kPa
Test Engineer:	Kay Hu
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

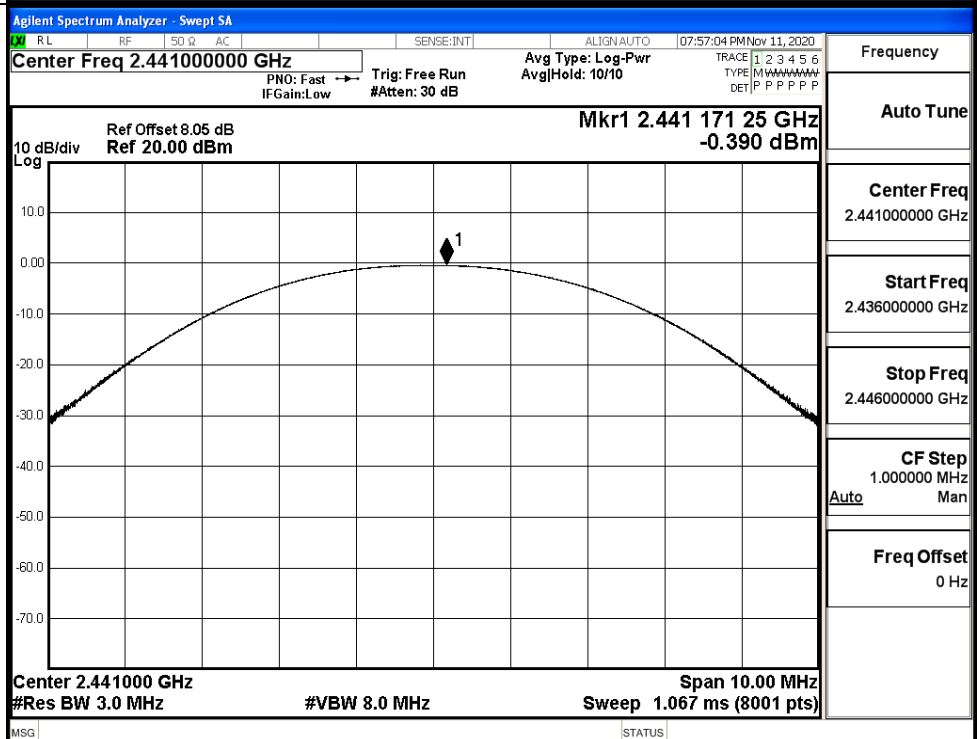
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.815	30	PASS
	MCH	-0.390	30	PASS
	HCH	-0.913	30	PASS
$\pi/4$ DQPSK	LCH	-0.806	21	PASS
	MCH	-0.353	21	PASS
	HCH	-0.915	21	PASS
8DPSK	LCH	-0.780	21	PASS
	MCH	-0.371	21	PASS
	HCH	-0.897	21	PASS

Test Graphs

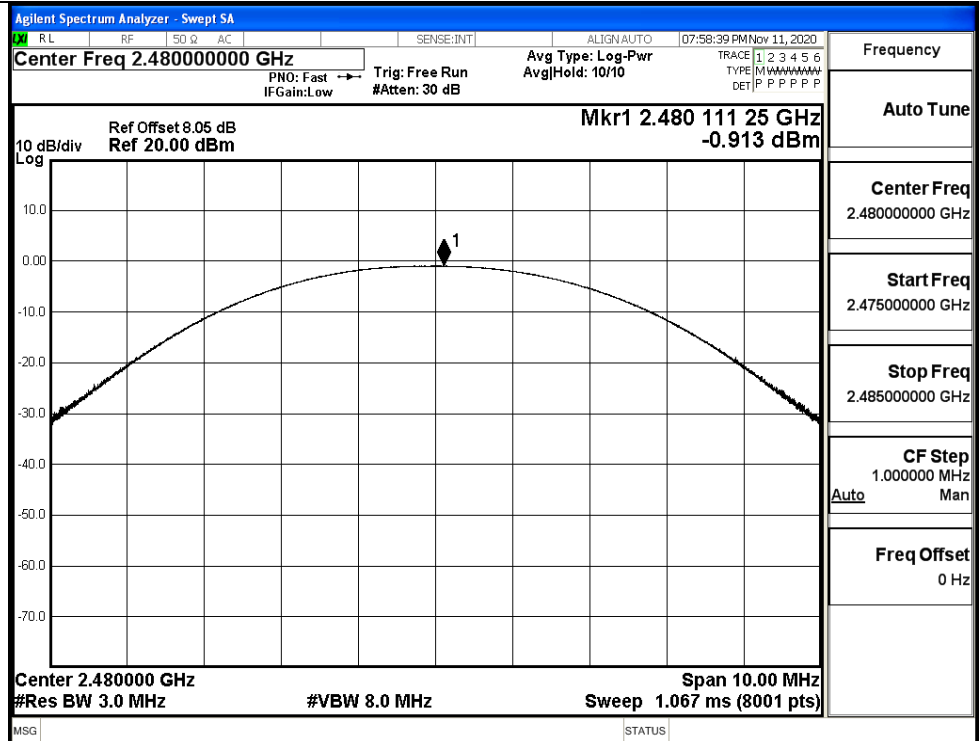
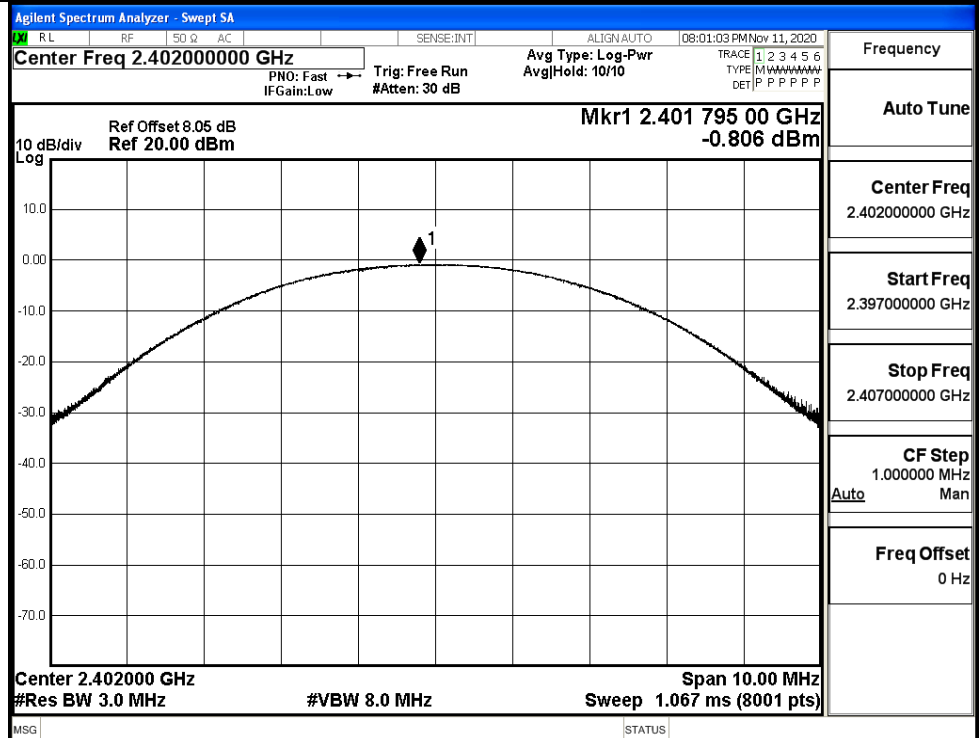
GFSK/LCH

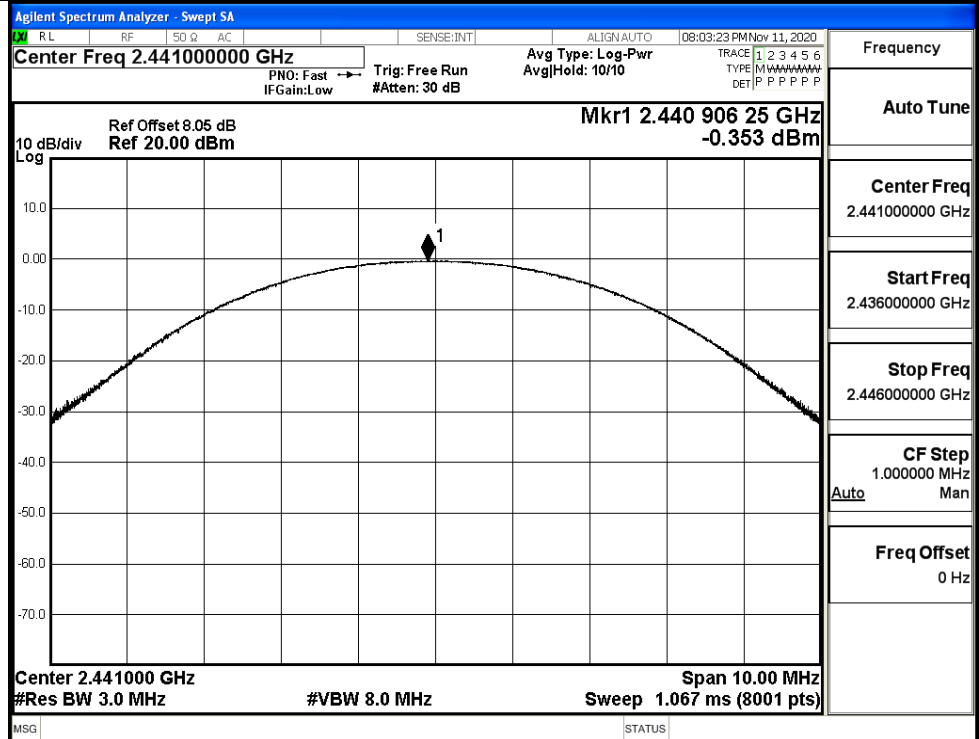
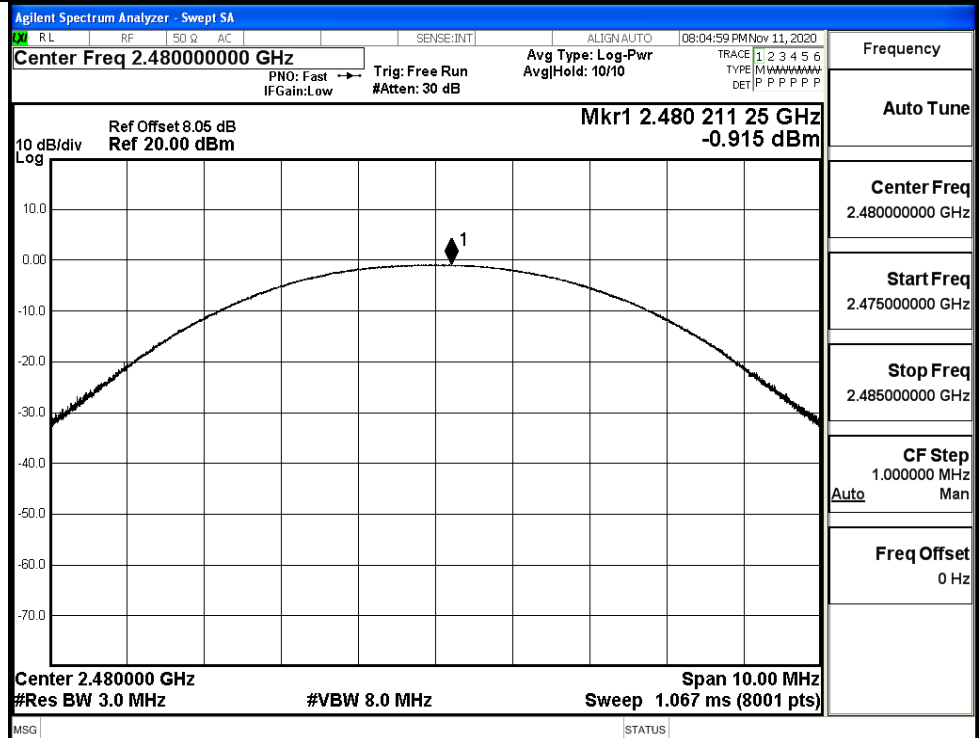


GFSK/MCH

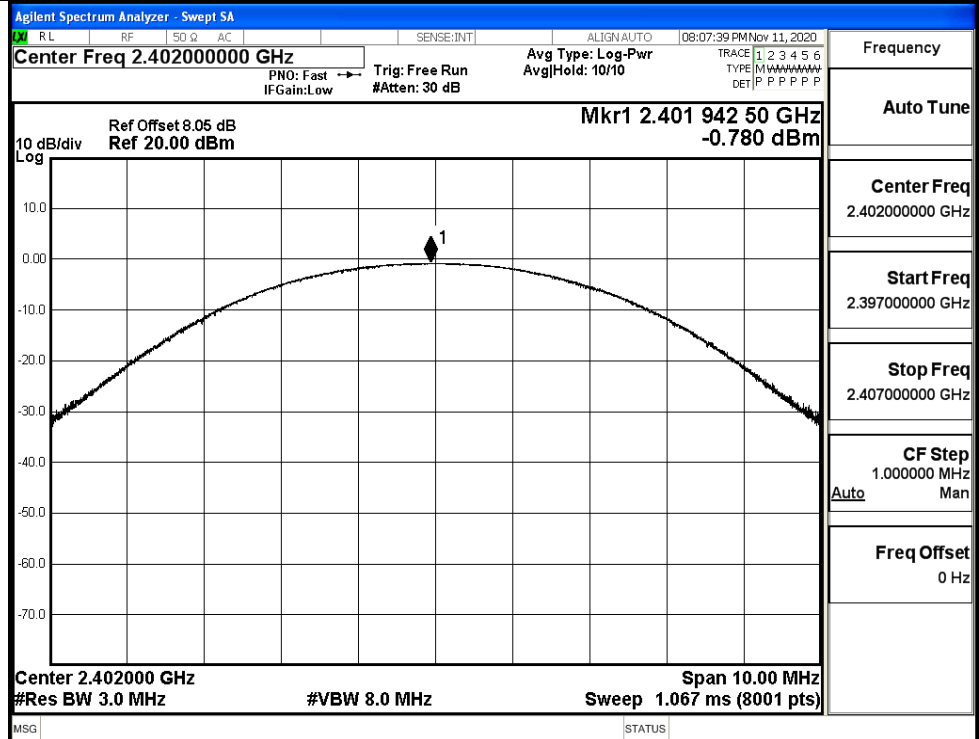


GFSK/HCH

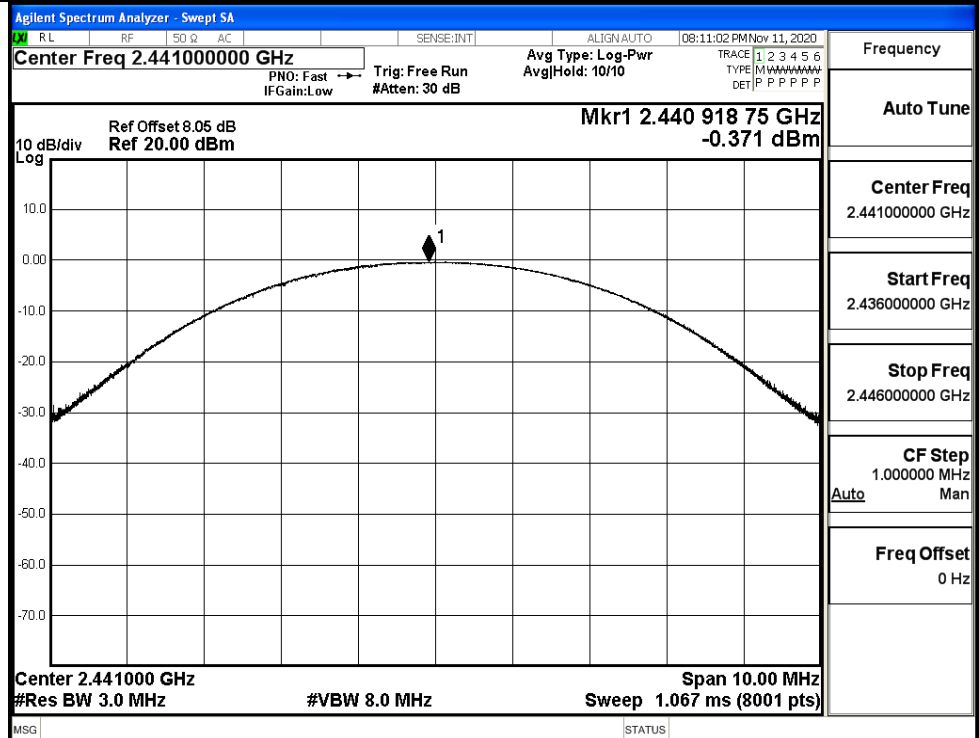
 $\pi/4$ DQPSK/LCH

π /4DQPSK/MCH π /4DQPSK/HCH

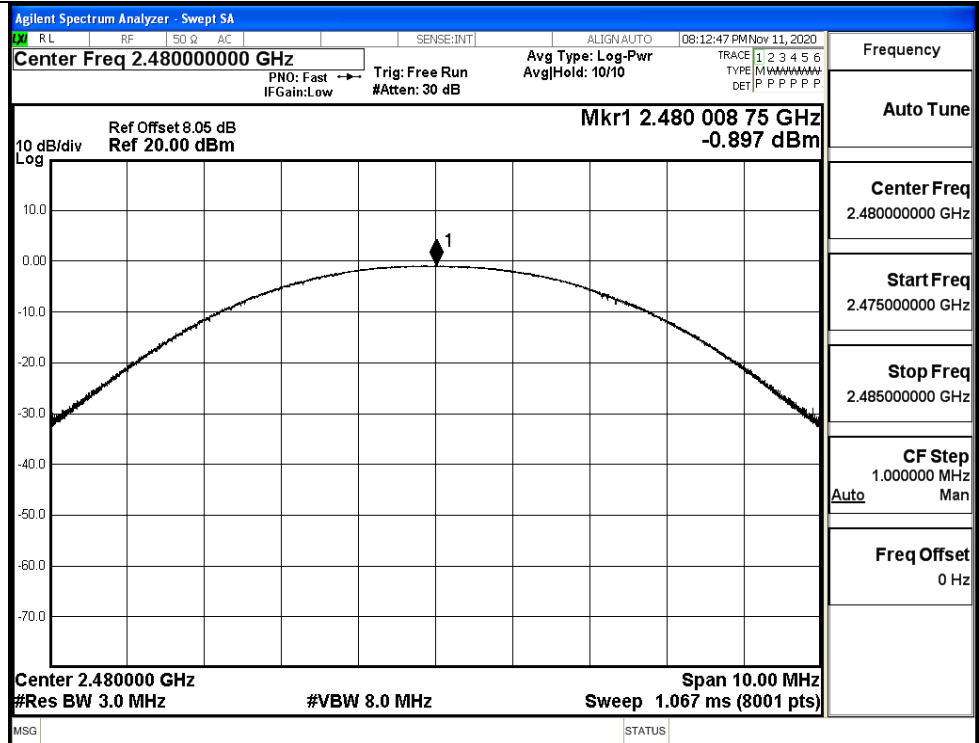
8DPSK/LCH



8DPSK/MCH



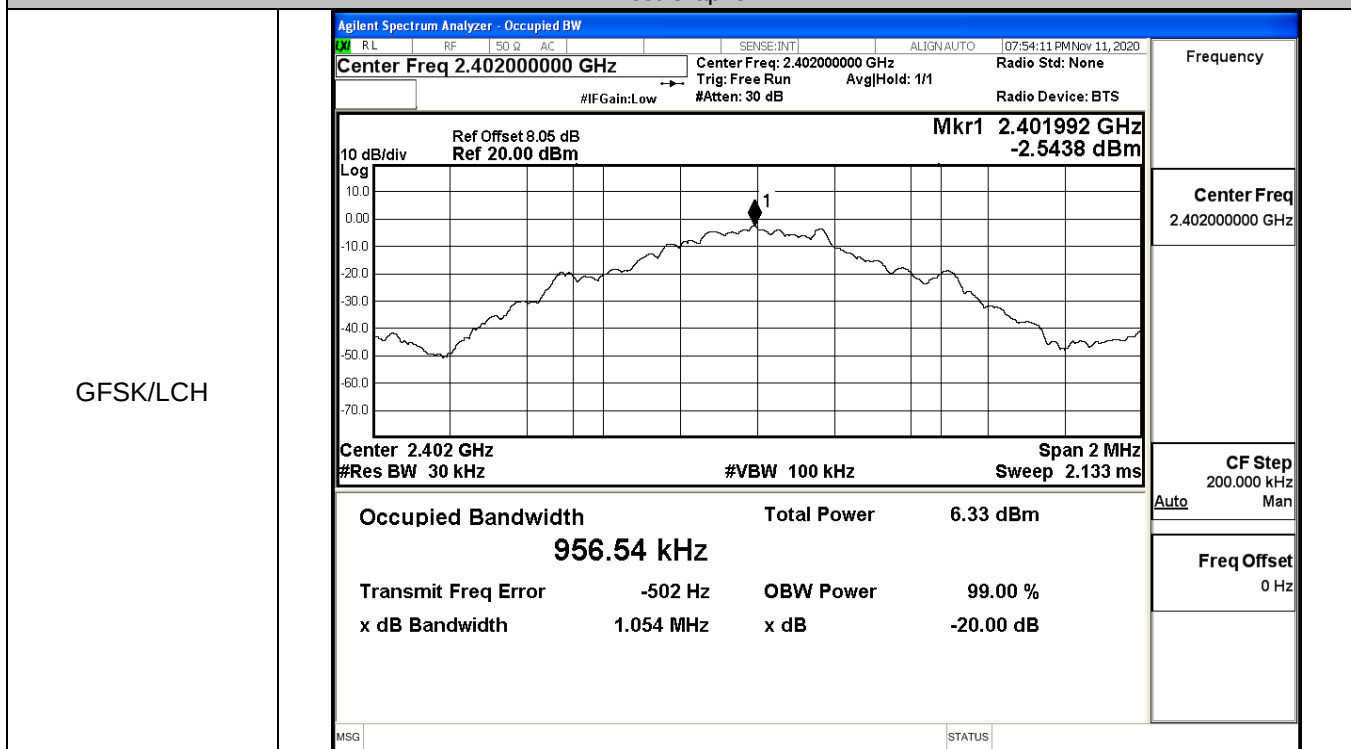
8DPSK/HCH



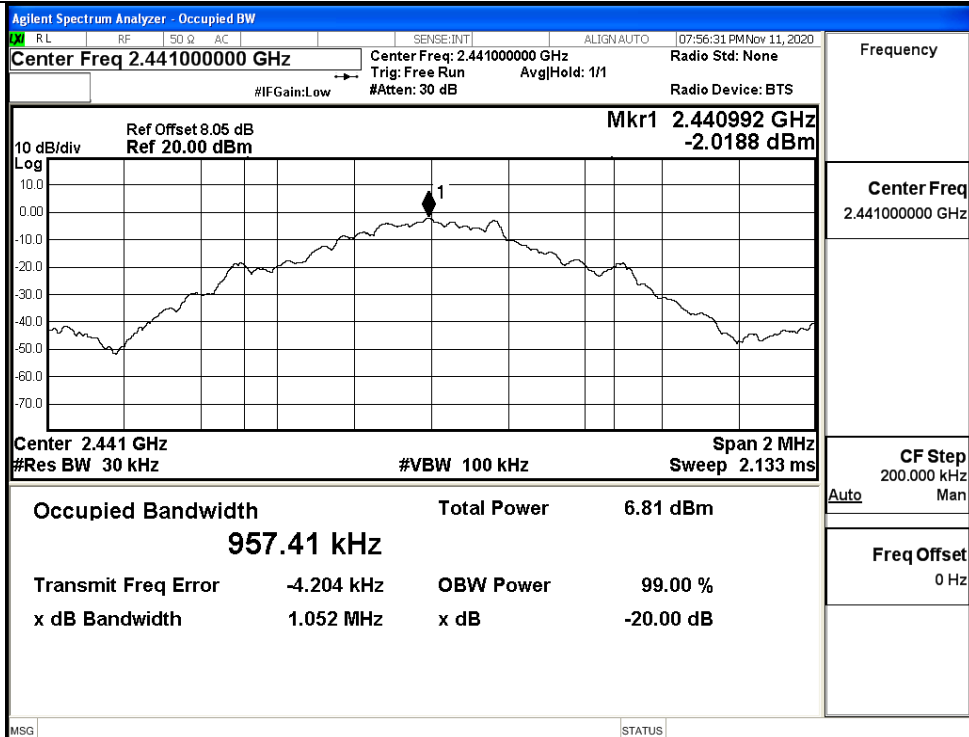
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.054	Not Specified	PASS
	MCH	1.052	Not Specified	PASS
	HCH	1.050	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.191	Not Specified	PASS
	MCH	1.191	Not Specified	PASS
	HCH	1.191	Not Specified	PASS
8DPSK	LCH	1.234	Not Specified	PASS
	MCH	1.233	Not Specified	PASS
	HCH	1.200	Not Specified	PASS

Test Graphs



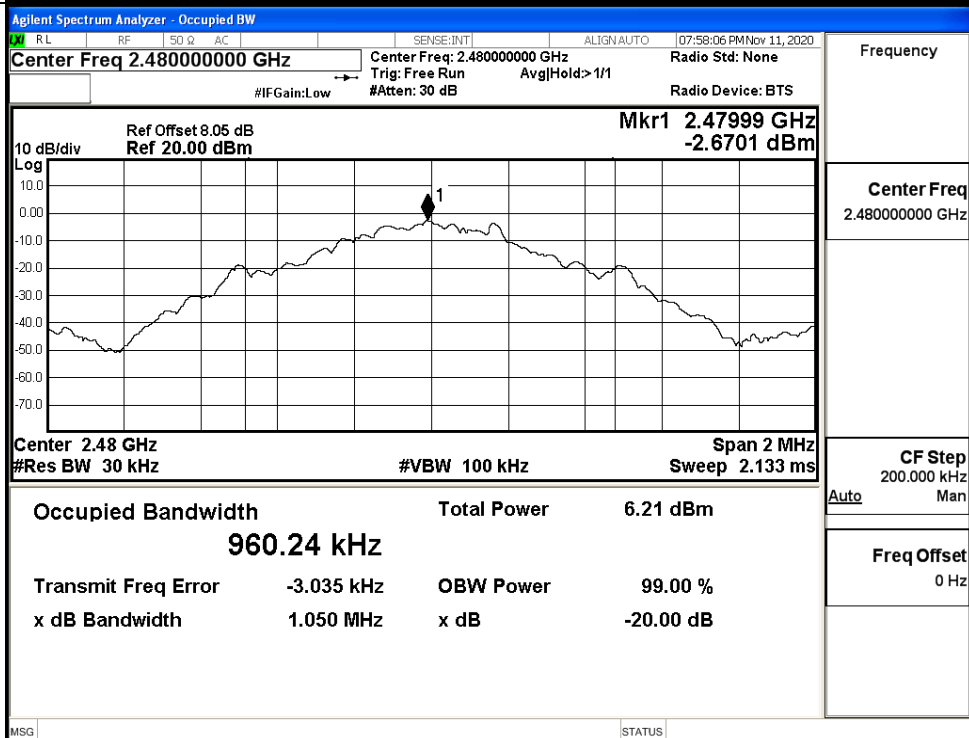
GFSK/MCH



Frequency

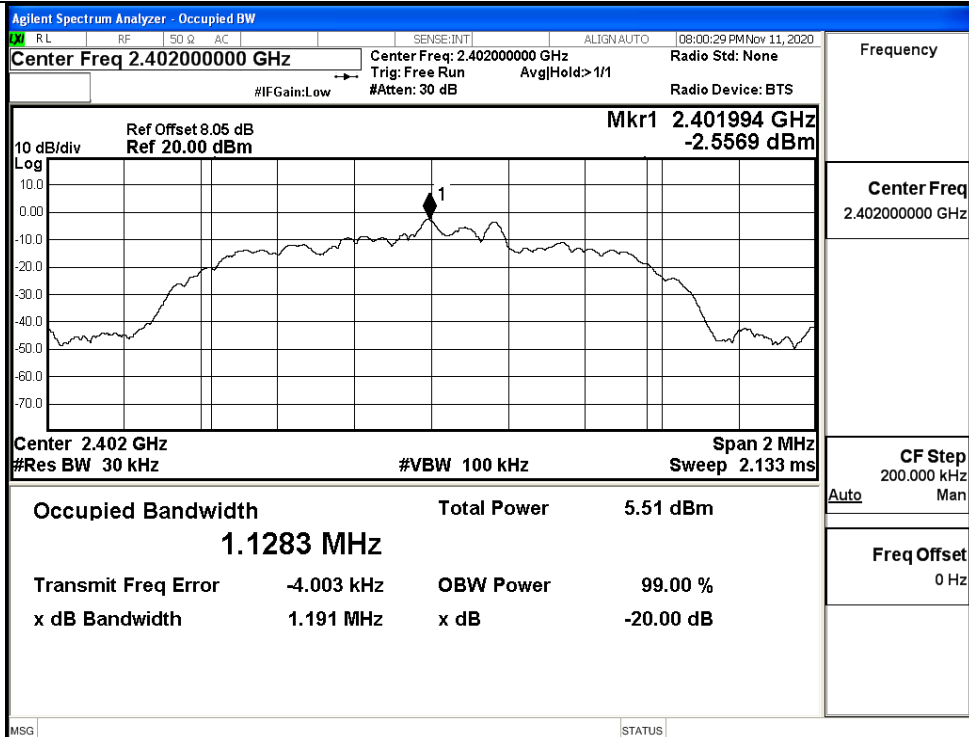
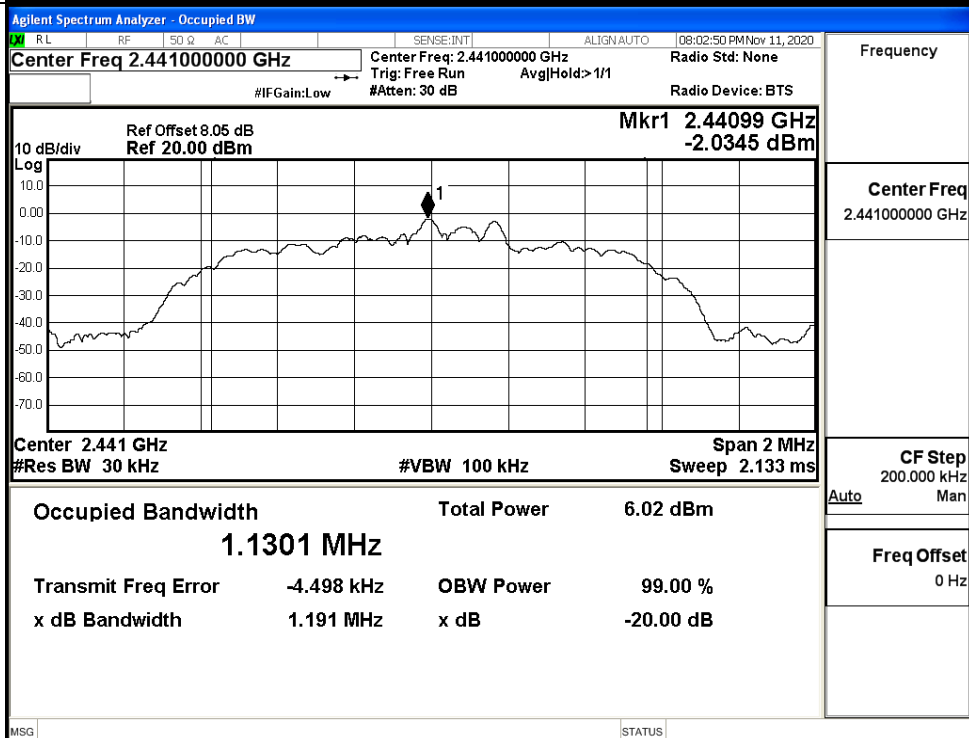
Center Freq
2.441000000 GHzCF Step
200.000 kHz
Auto ManFreq Offset
0 Hz

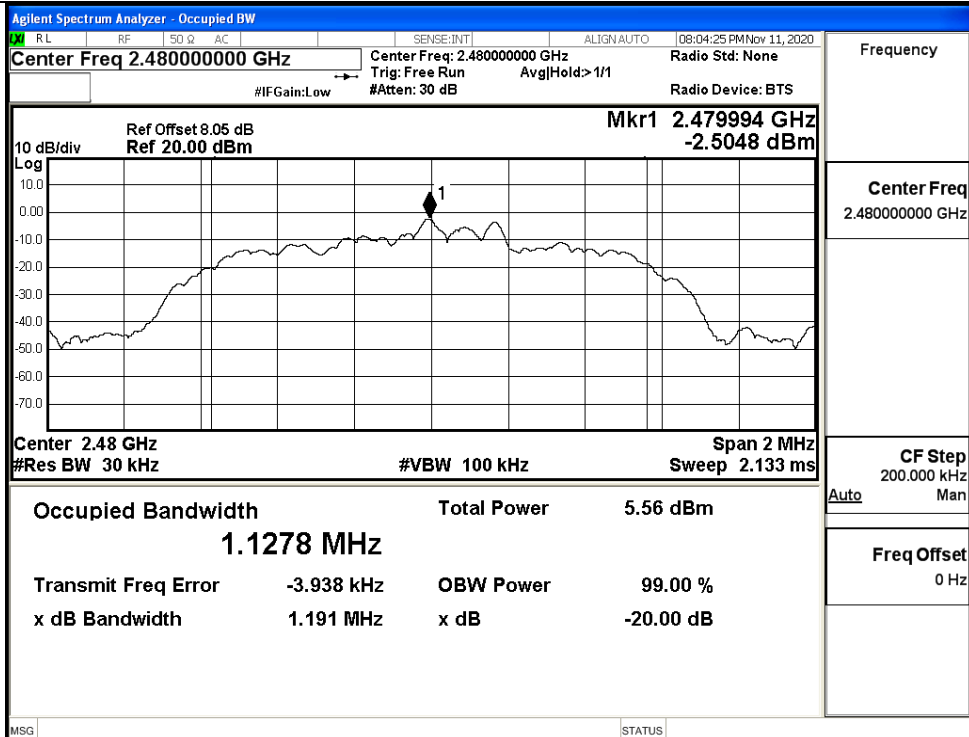
GFSK/HCH



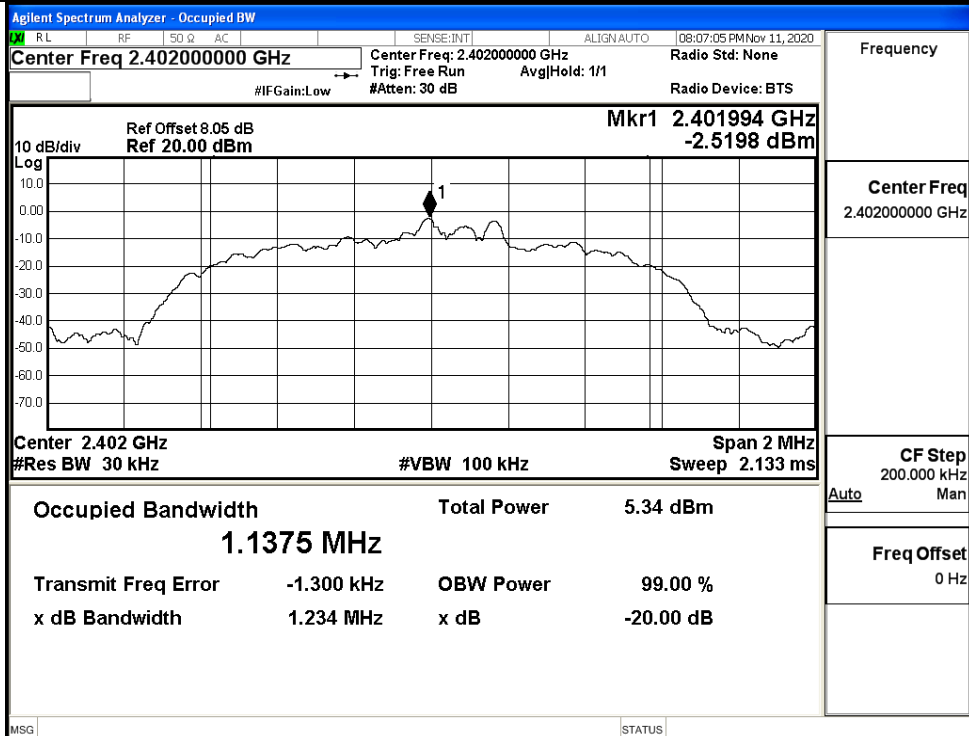
Frequency

Center Freq
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200.000 kHz
Auto ManFreq Offset
0 Hz

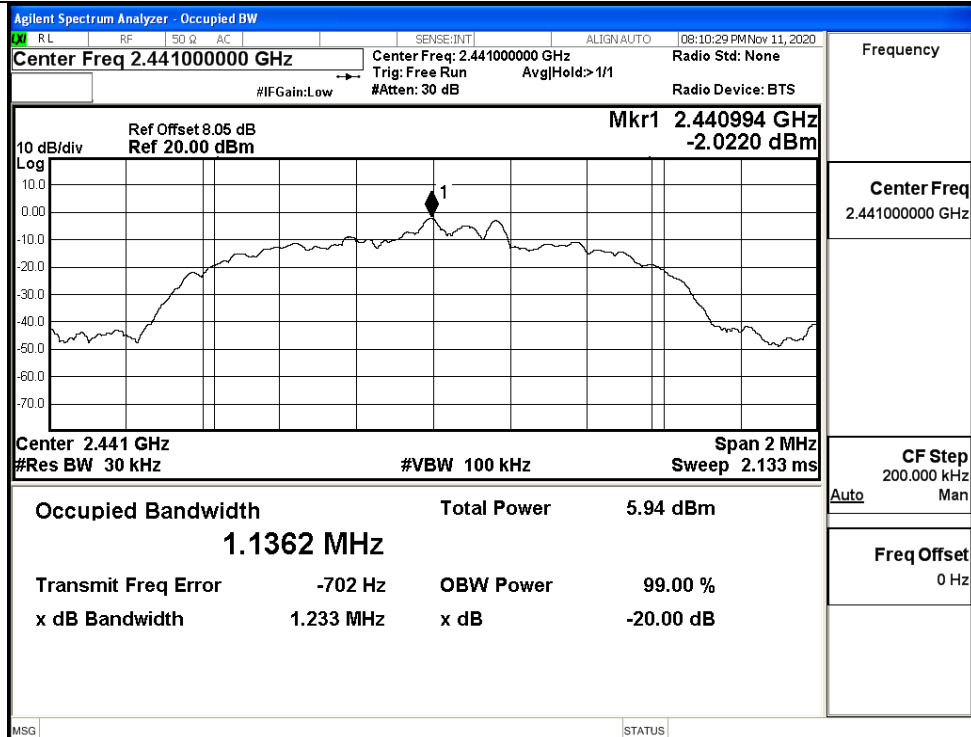
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

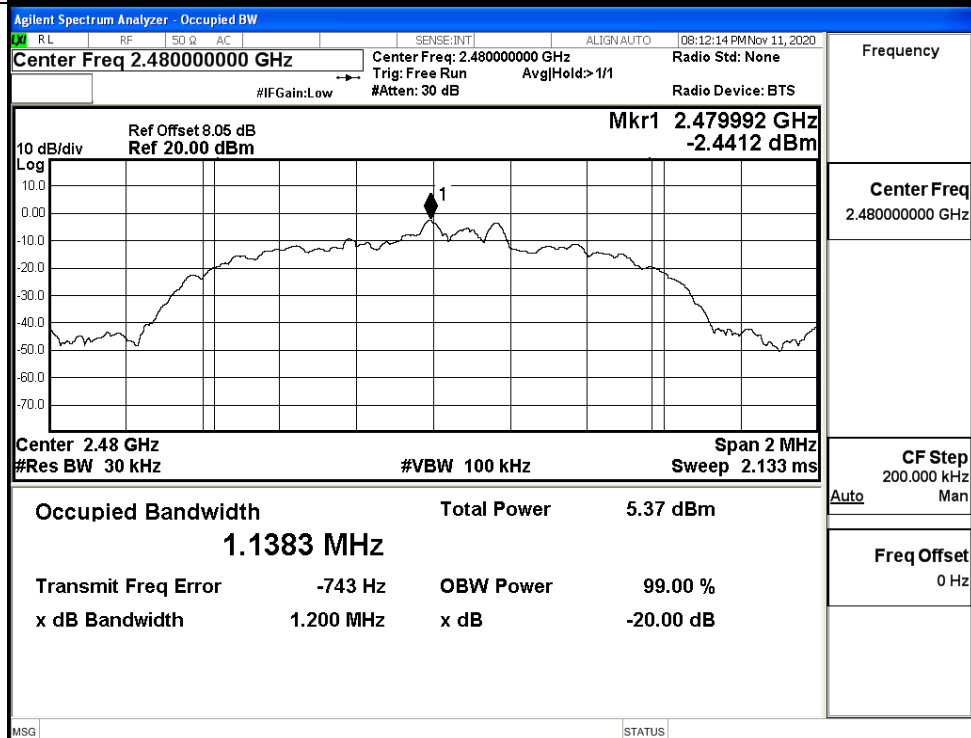
8DPSK/LCH



8DPSK/MCH



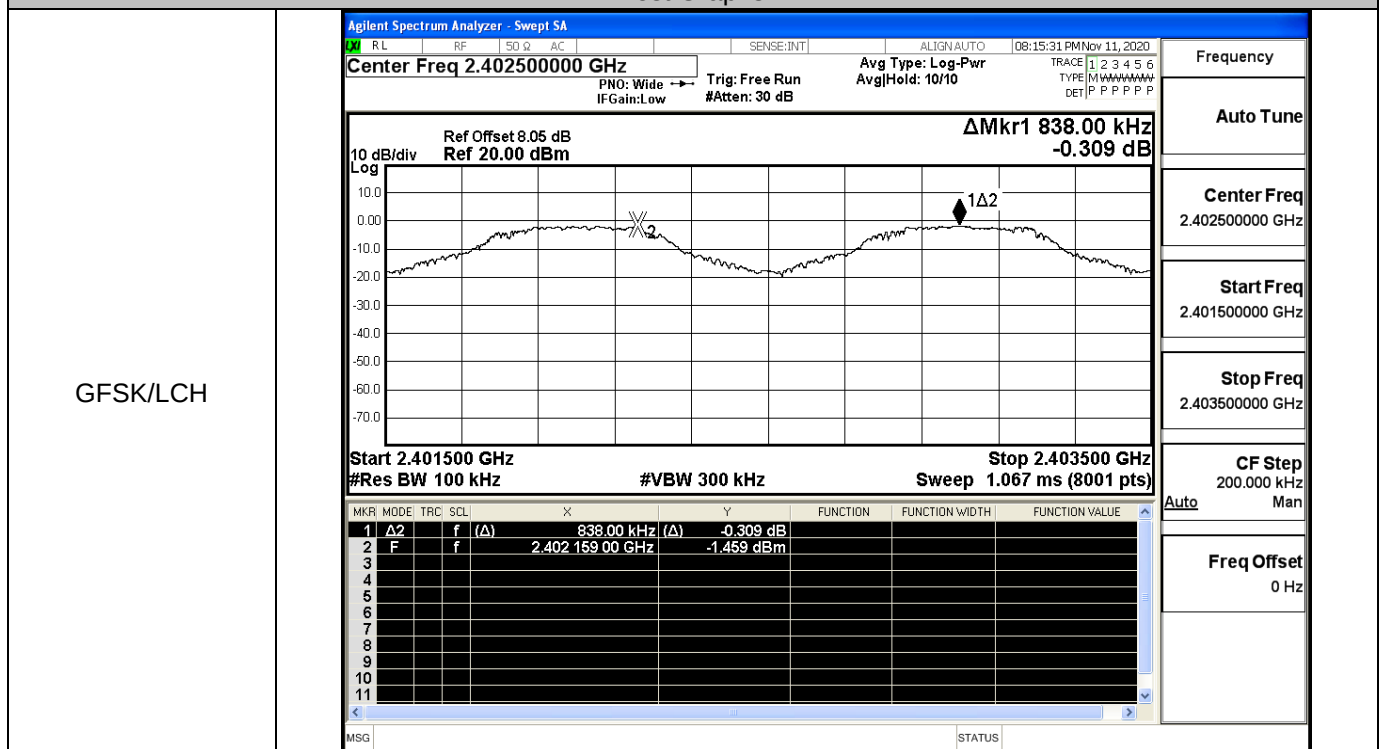
8DPSK/HCH



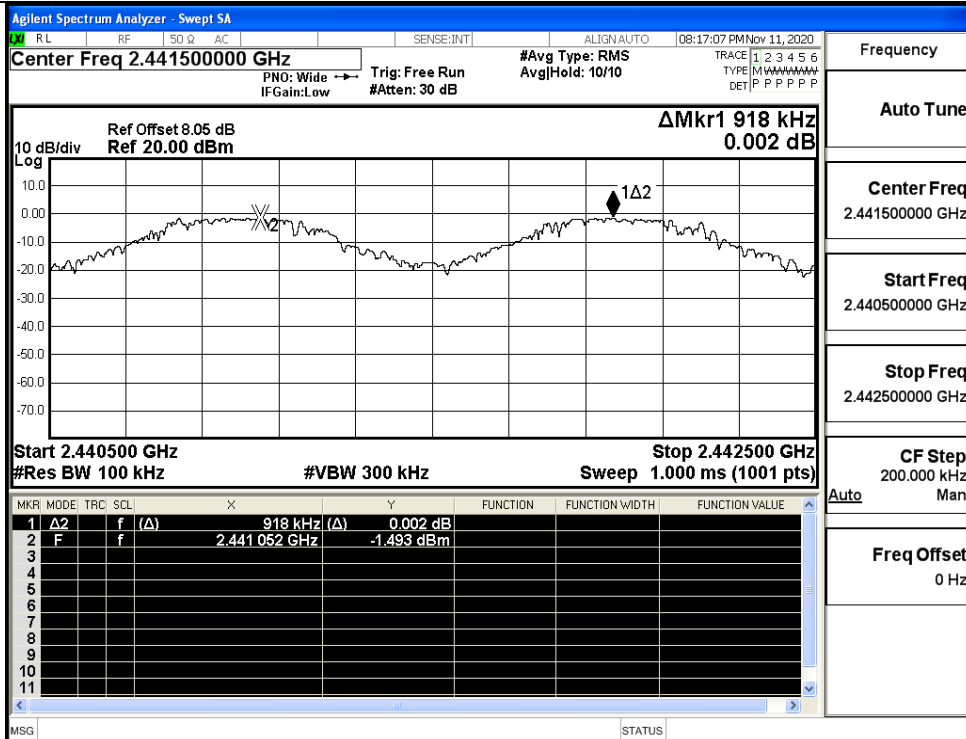
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.838	0.703	PASS
	MCH	0.918	0.703	PASS
	HCH	1.026	0.703	PASS
$\pi/4$ DQPSK	LCH	1.154	0.794	PASS
	MCH	0.990	0.794	PASS
	HCH	1.024	0.794	PASS
8DPSK	LCH	1.008	0.823	PASS
	MCH	1.026	0.823	PASS
	HCH	1.234	0.823	PASS

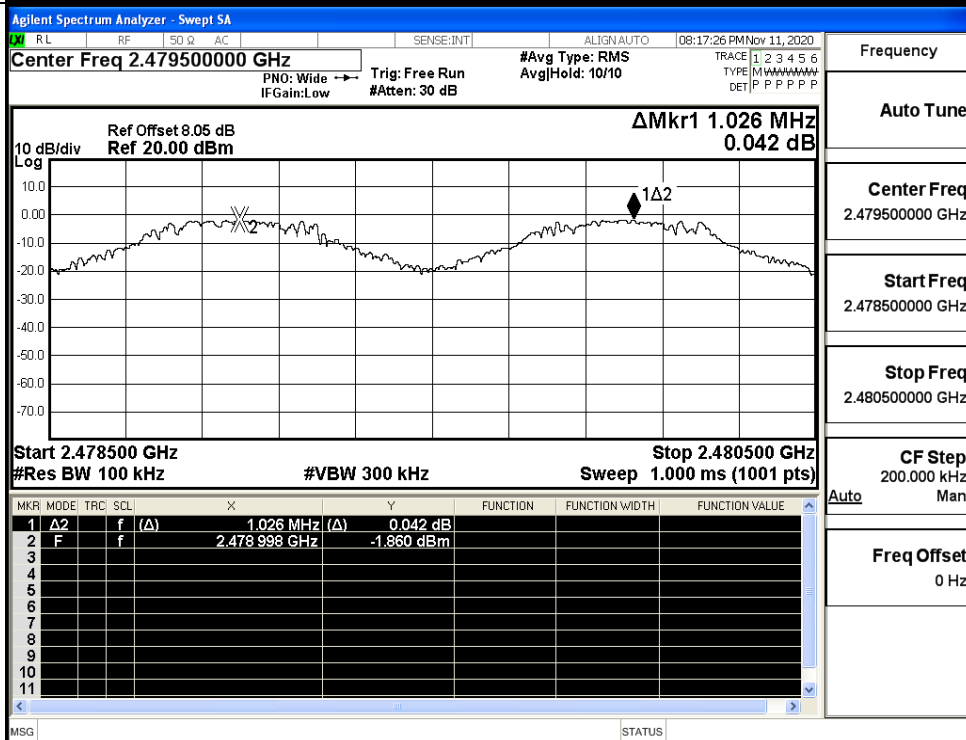
Test Graphs

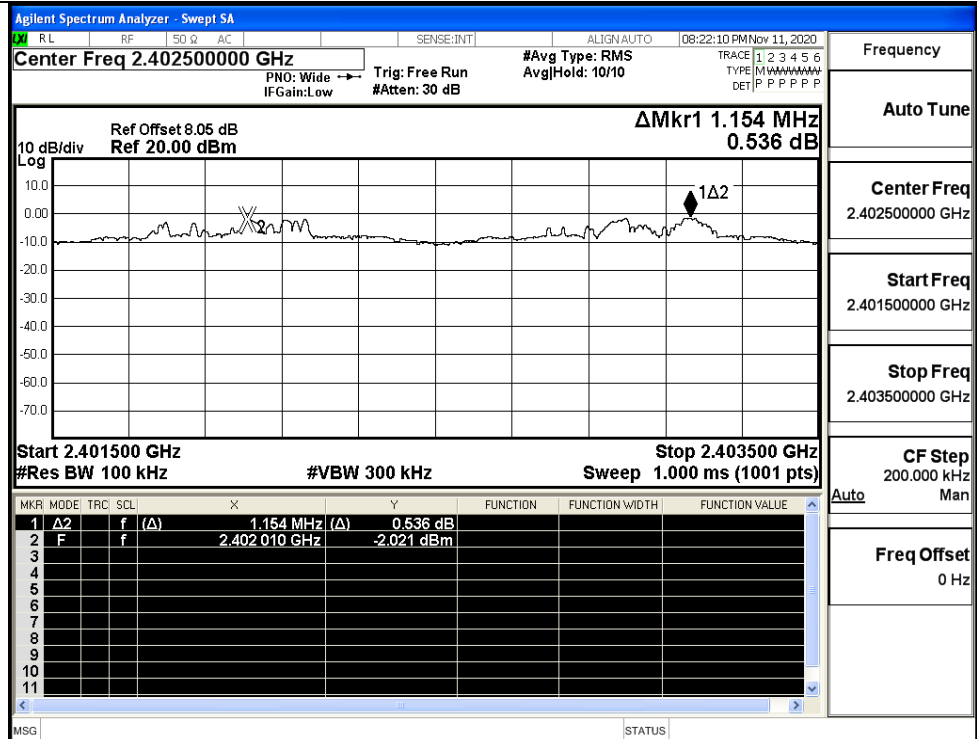
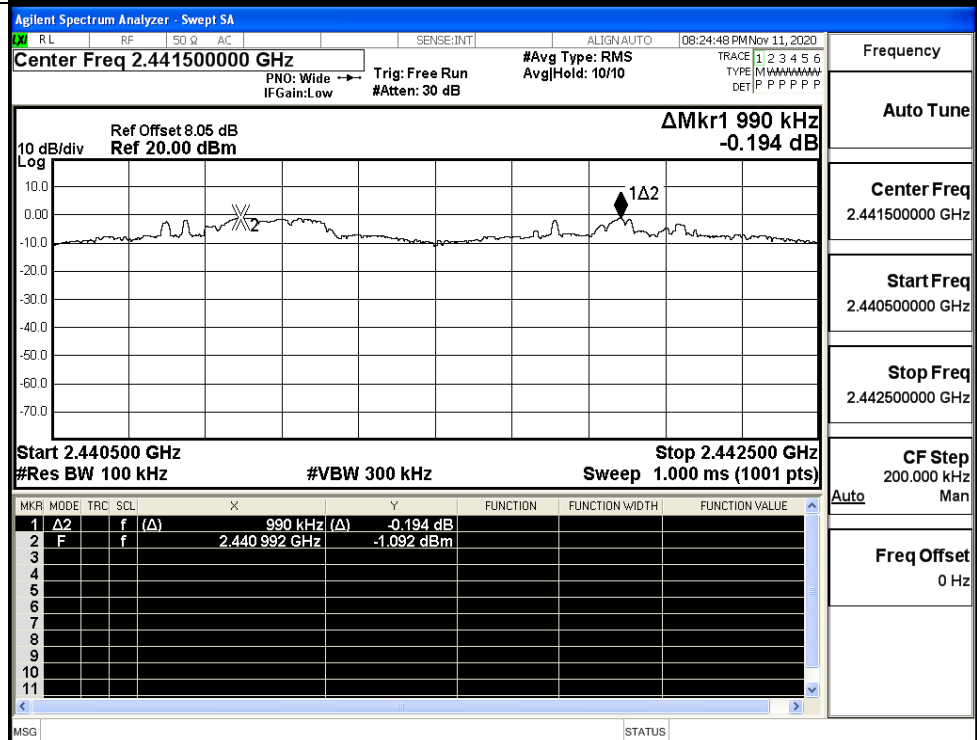


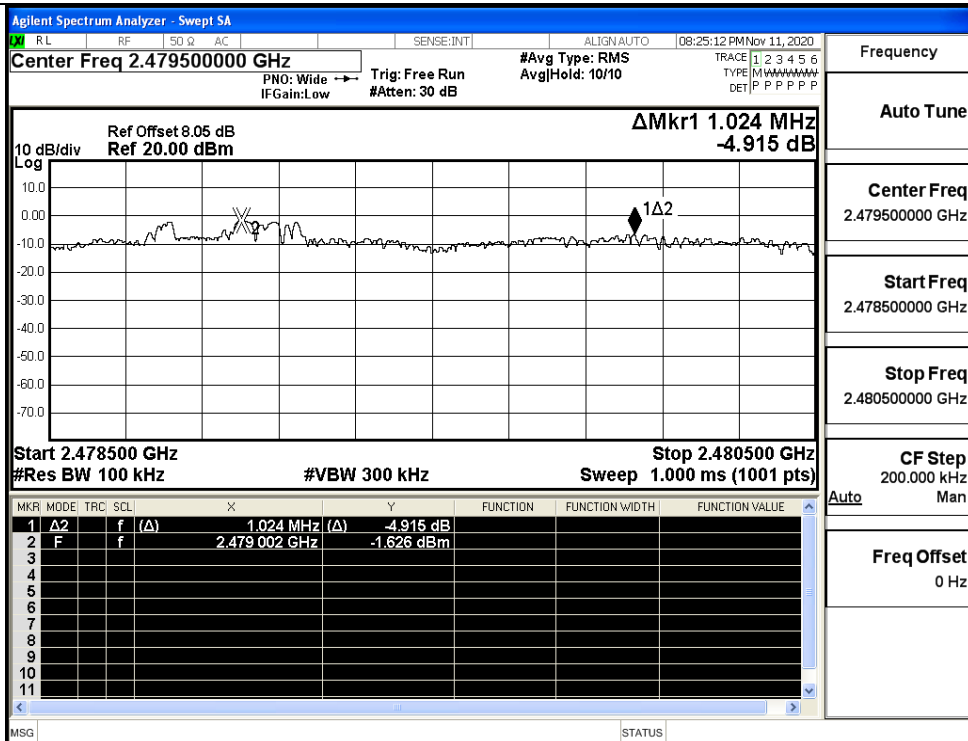
GFSK/MCH



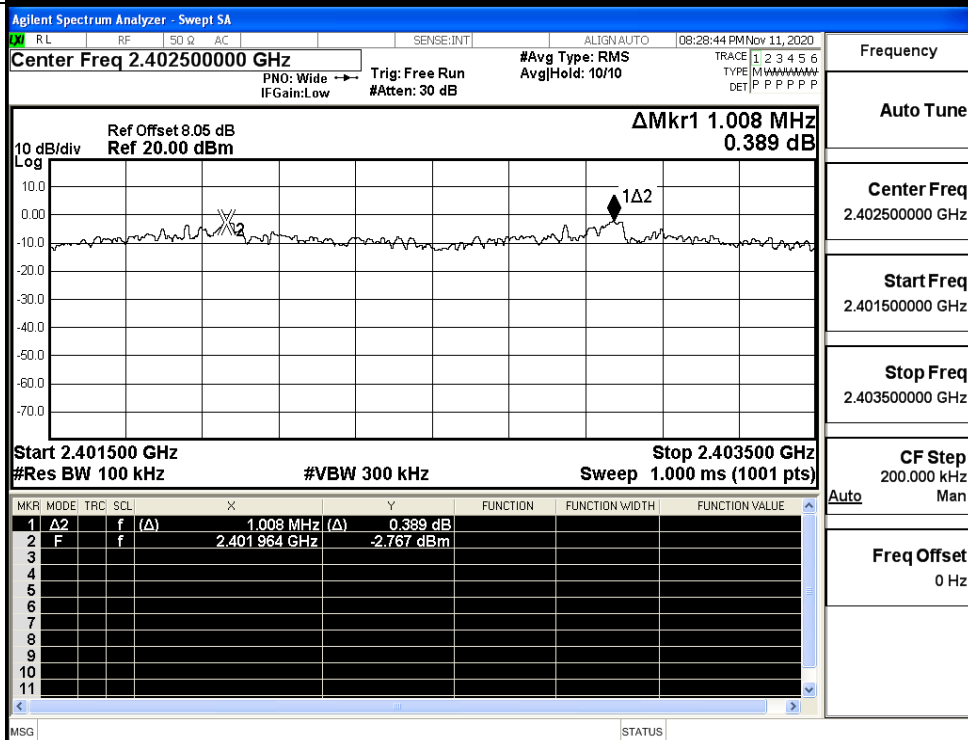
GFSK/HCH



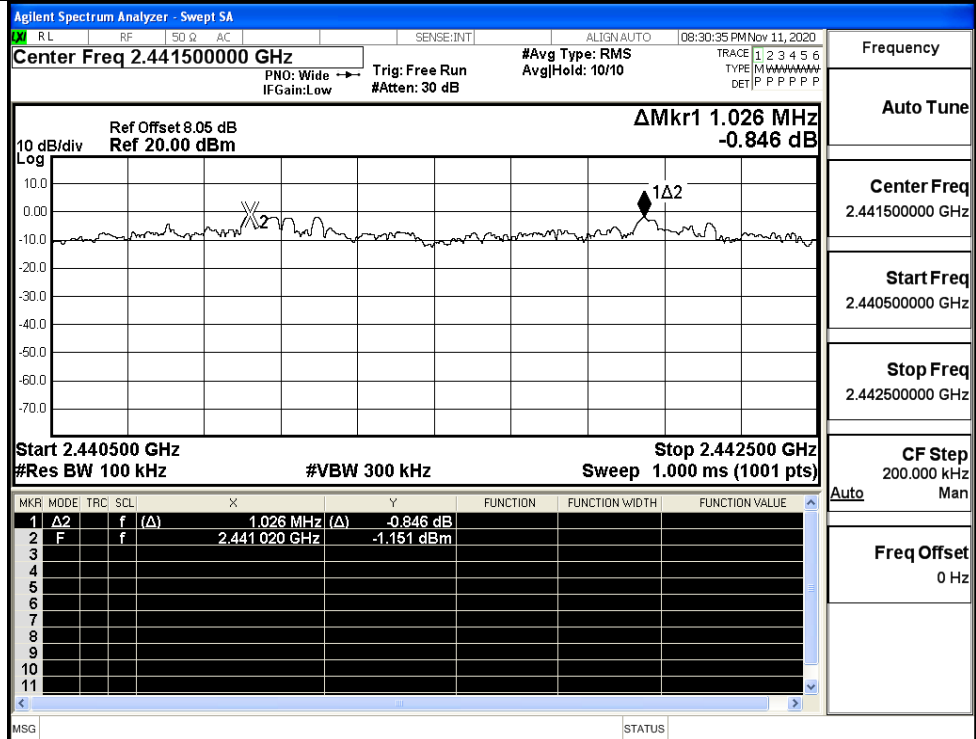
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

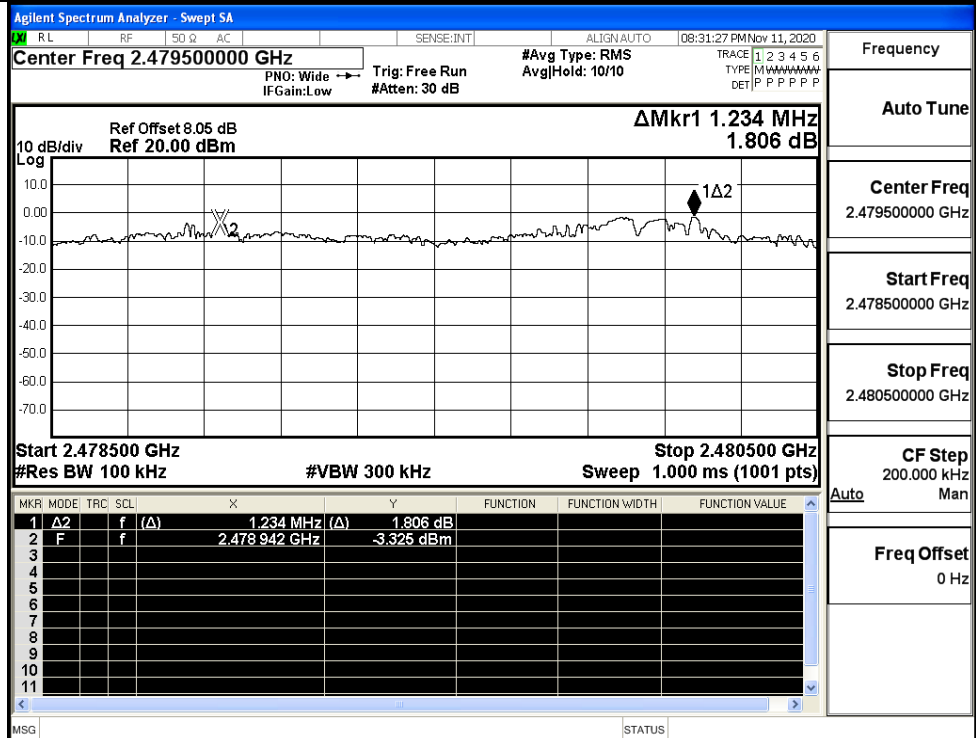
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

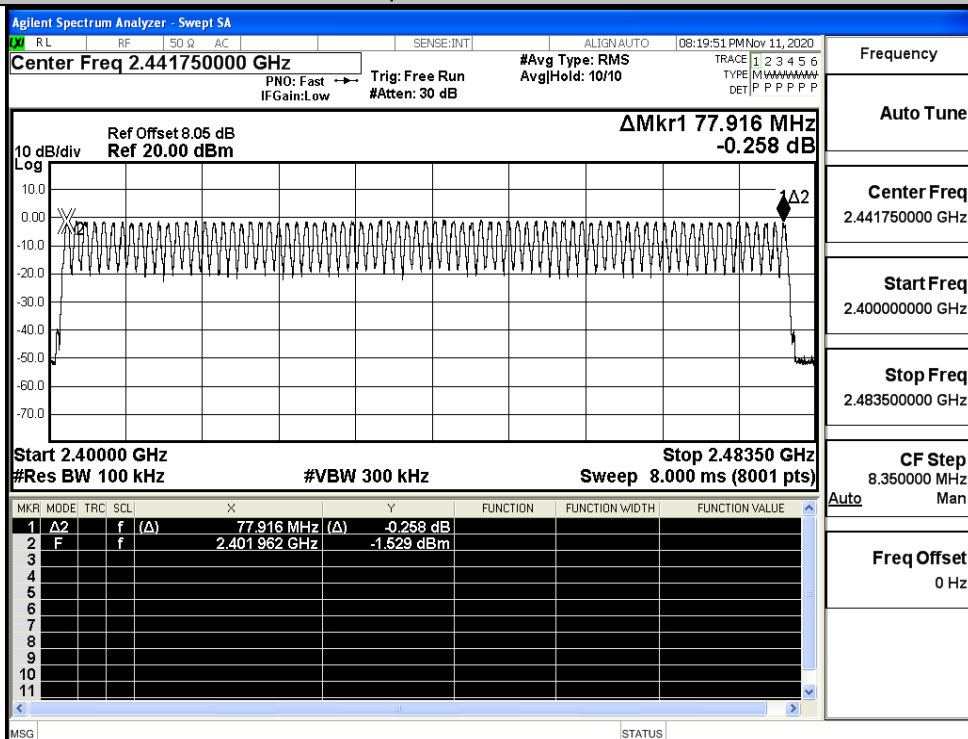
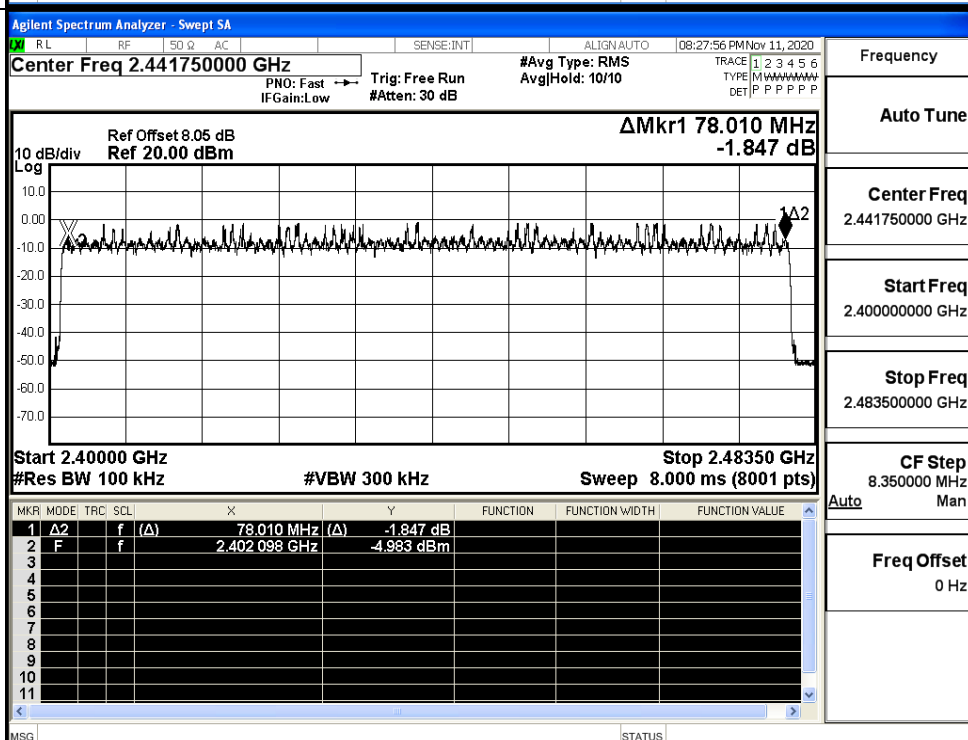


A.4 Hopping Channel Number

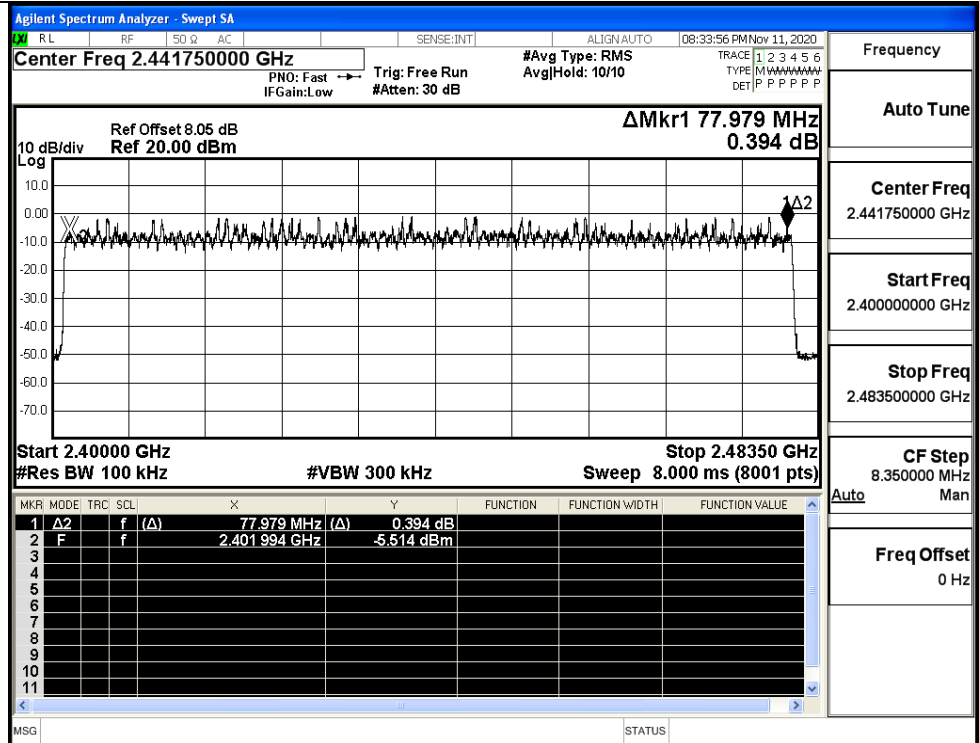
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
$\pi/4$ DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

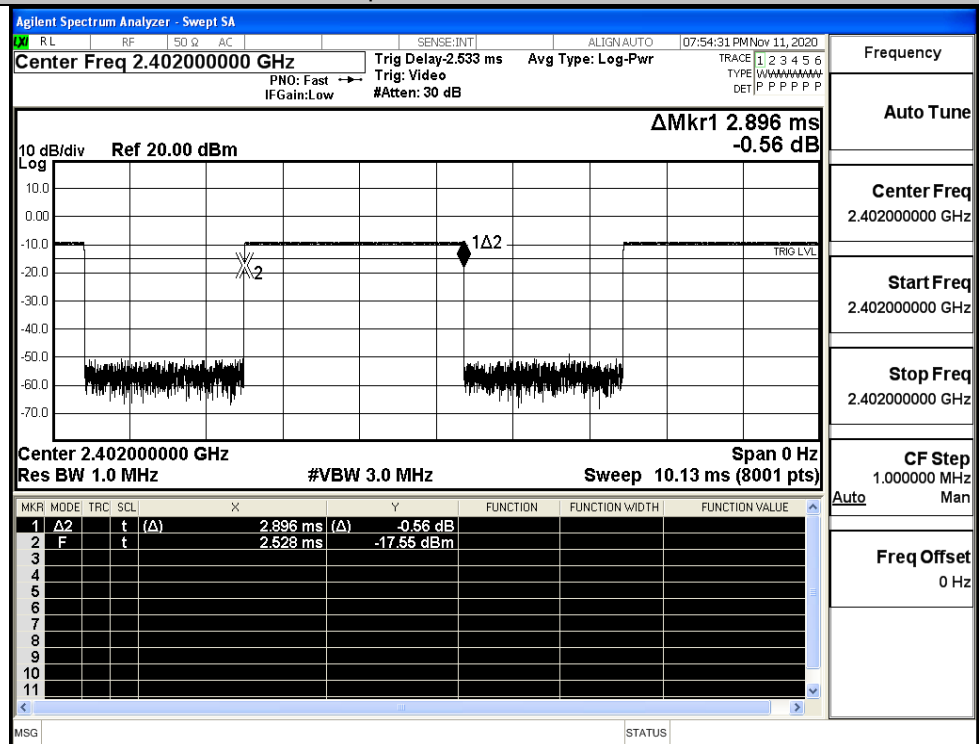


A.5 Dwell Time

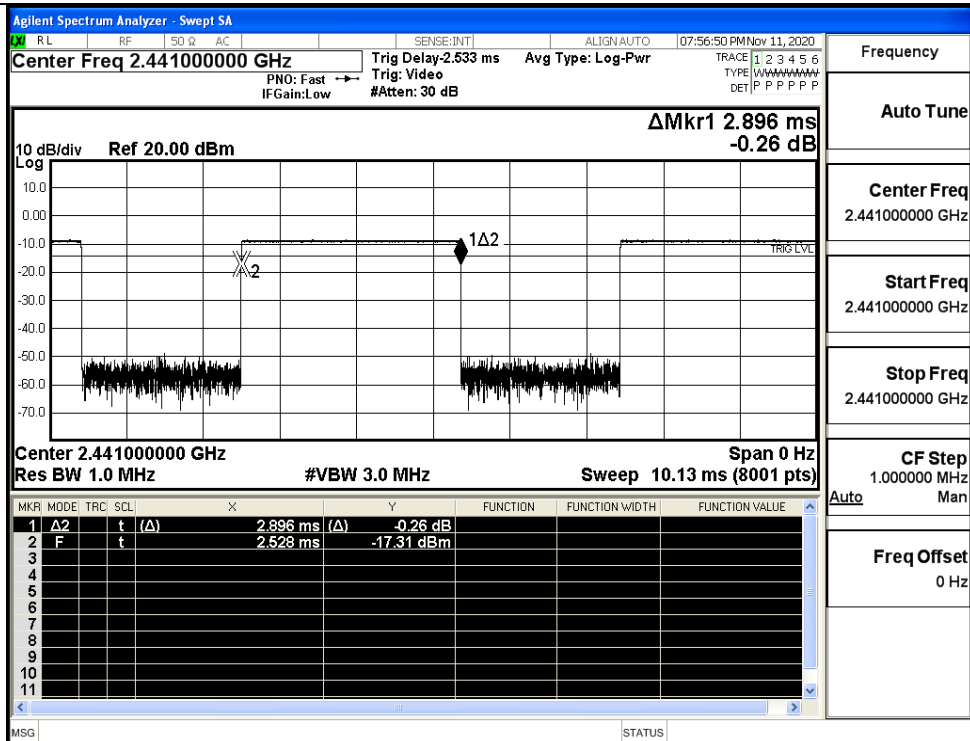
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.9	106.7	0.309	0.4	PASS
	DH5	MCH	2.9	106.7	0.309	0.4	PASS
	DH5	HCH	2.9	106.7	0.309	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.9	106.7	0.309	0.4	PASS
	2DH5	MCH	2.9	106.7	0.309	0.4	PASS
	2DH5	HCH	2.9	106.7	0.309	0.4	PASS
8DPSK	3DH5	LCH	2.9	106.7	0.309	0.4	PASS
	3DH5	MCH	2.9	106.7	0.309	0.4	PASS
	3DH5	HCH	2.9	106.7	0.309	0.4	PASS

Test Graphs

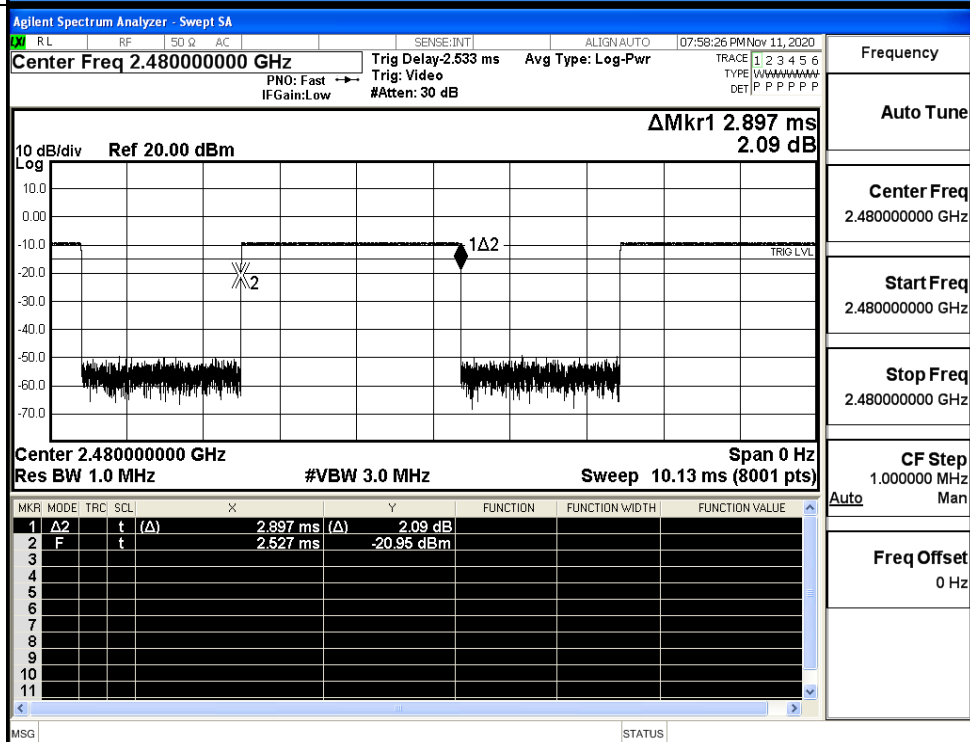
GFSK_DH5/LCH



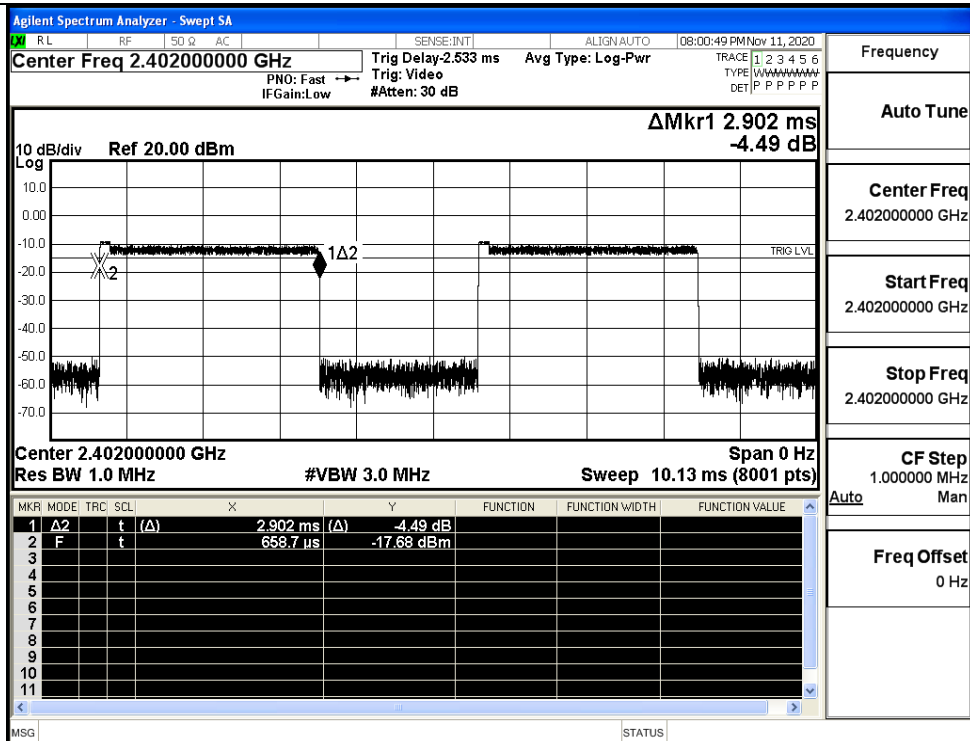
GFSK_DH5/MCH



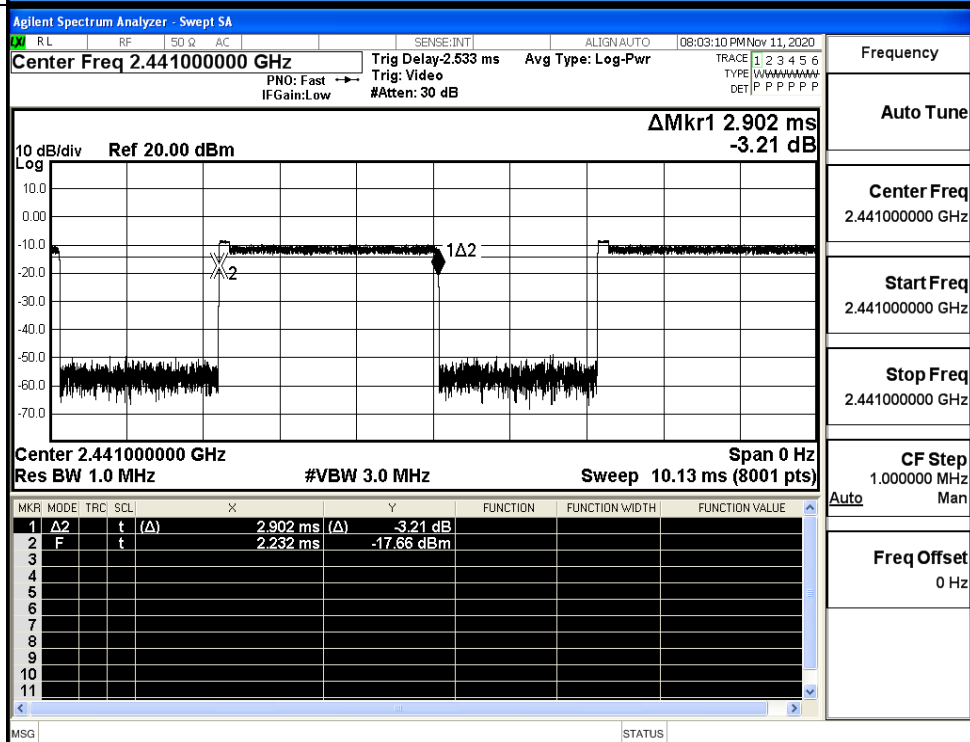
GFSK_DH5/HCH



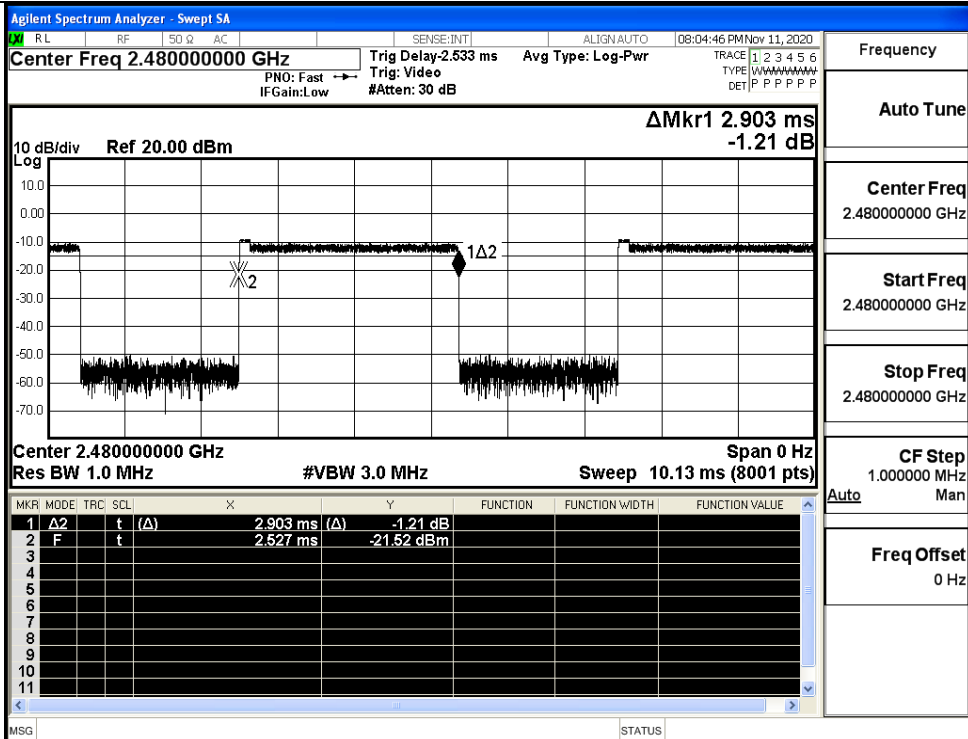
$\pi/4$ DQPSK
_2DH5/LCH



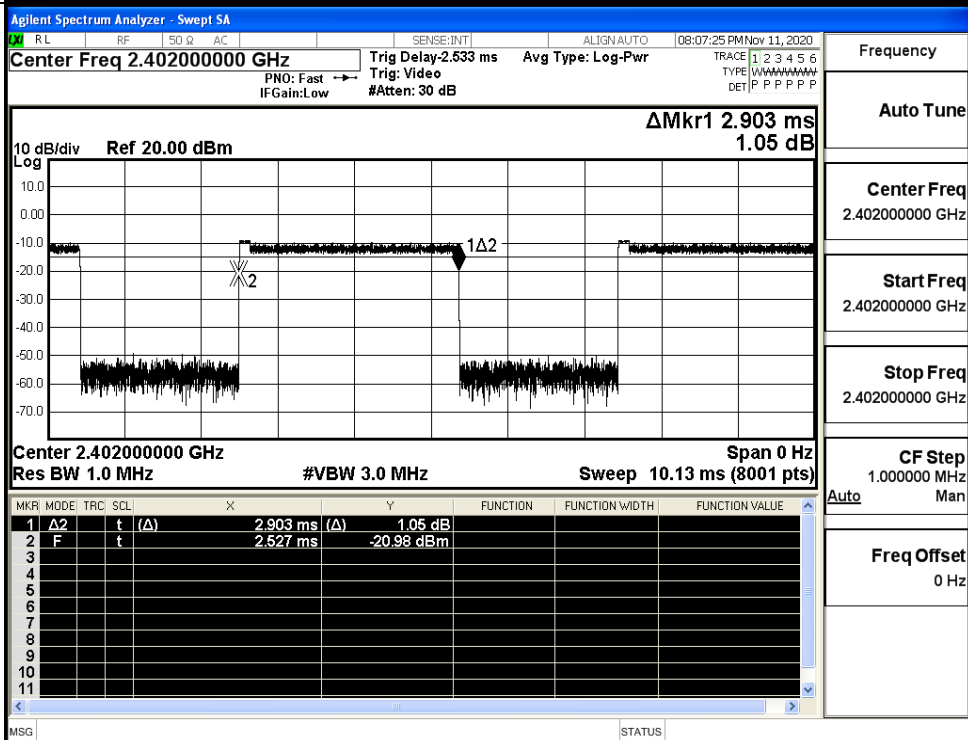
$\pi/4$ DQPSK
_2DH5/MCH



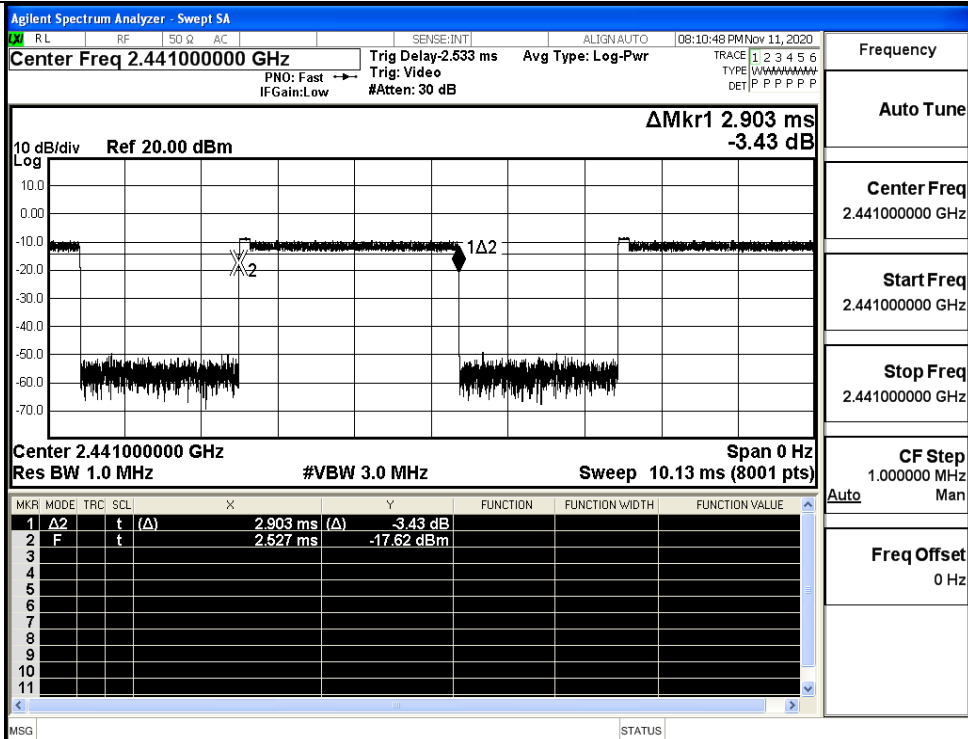
$\pi/4$ DQPSK
_2DH5/HCH



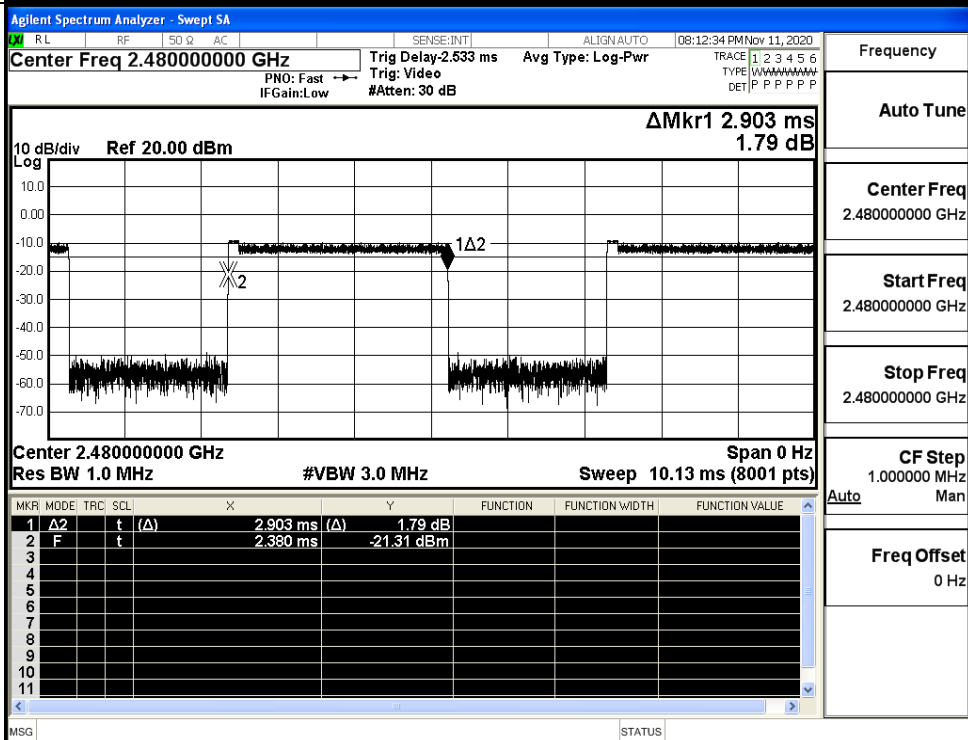
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



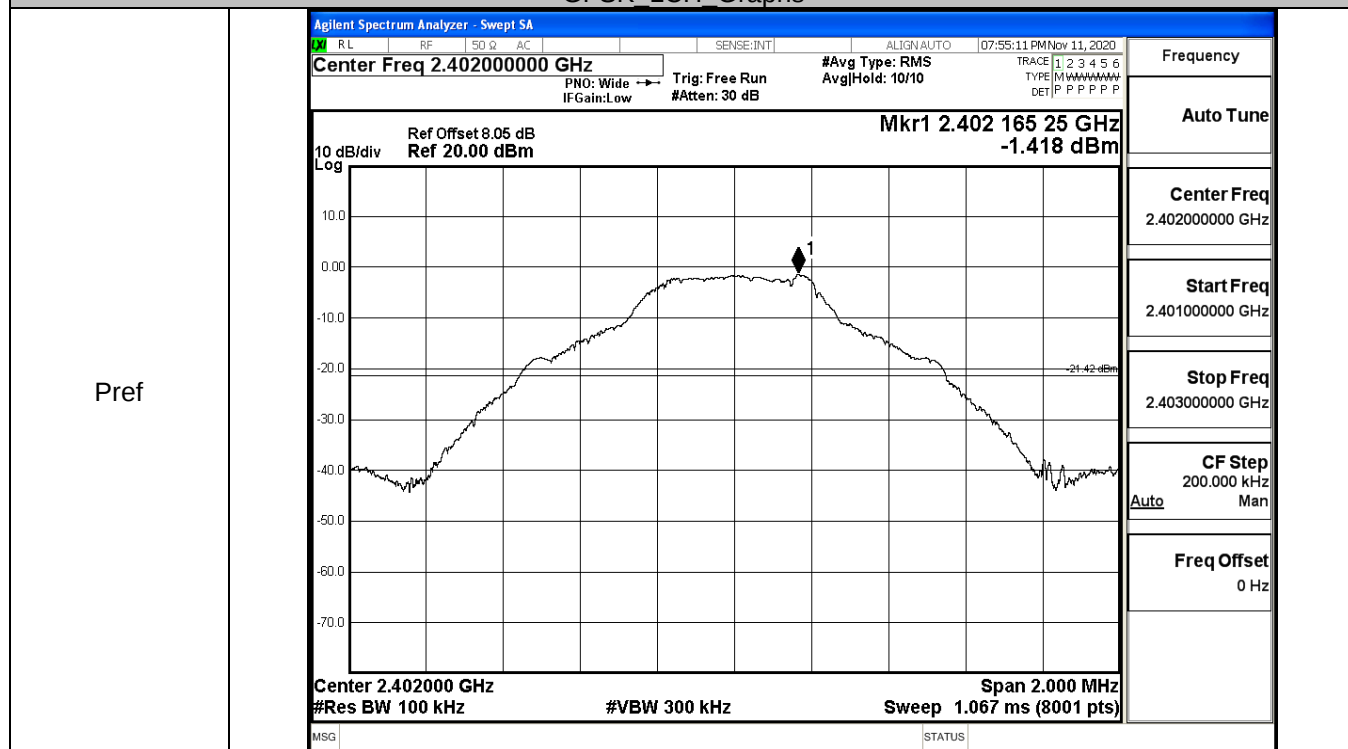
8DPSK_3DH5/HCH



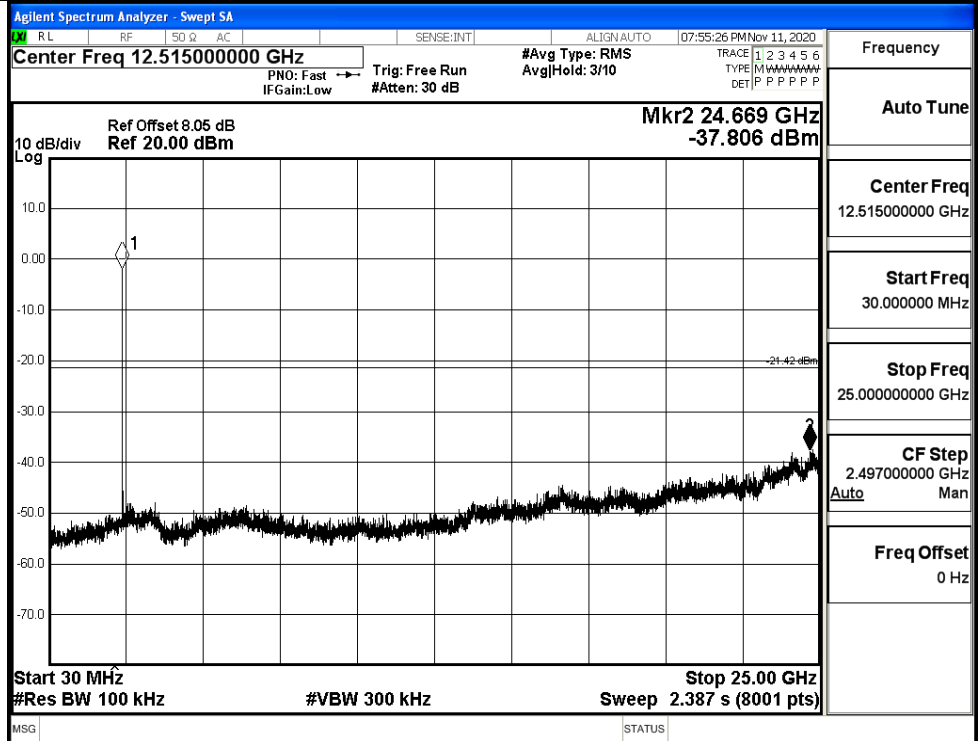
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.418	-37.806	-21.418	PASS
	MCH	-0.933	-37.919	-20.933	PASS
	HCH	-1.49	-37.108	-21.490	PASS
$\pi/4$ DQPSK	LCH	-1.652	-37.421	-21.652	PASS
	MCH	-0.971	-37.274	-20.971	PASS
	HCH	-1.481	-37.493	-21.481	PASS
8DPSK	LCH	-1.357	-36.730	-21.357	PASS
	MCH	-1.167	-37.713	-21.167	PASS
	HCH	-1.705	-37.635	-21.705	PASS

GFSK LCH Graphs

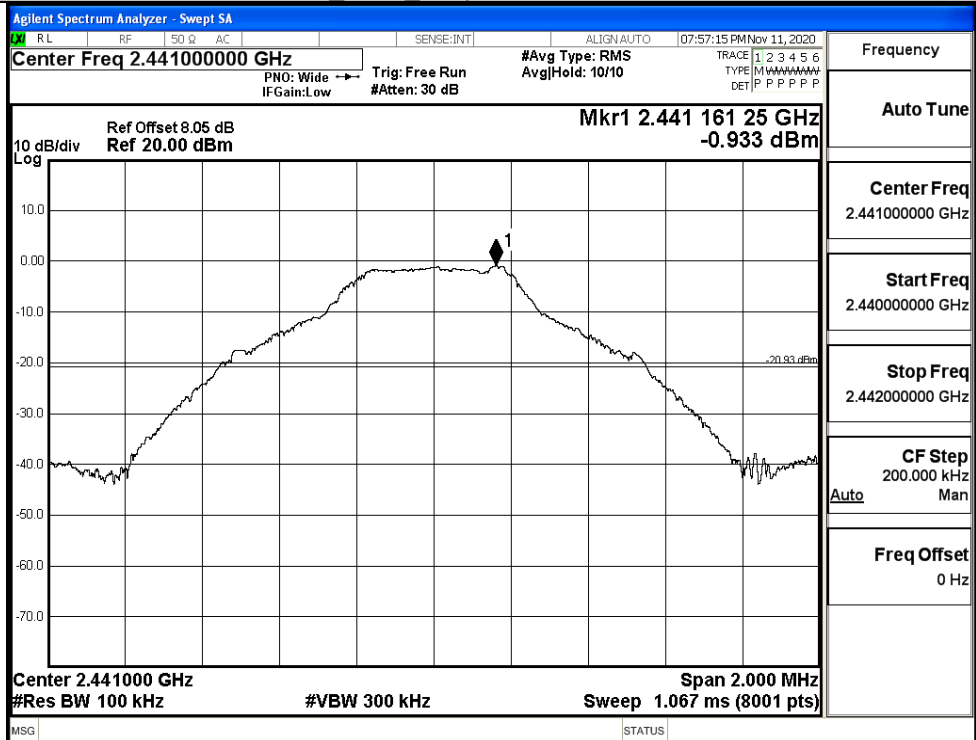


Puw

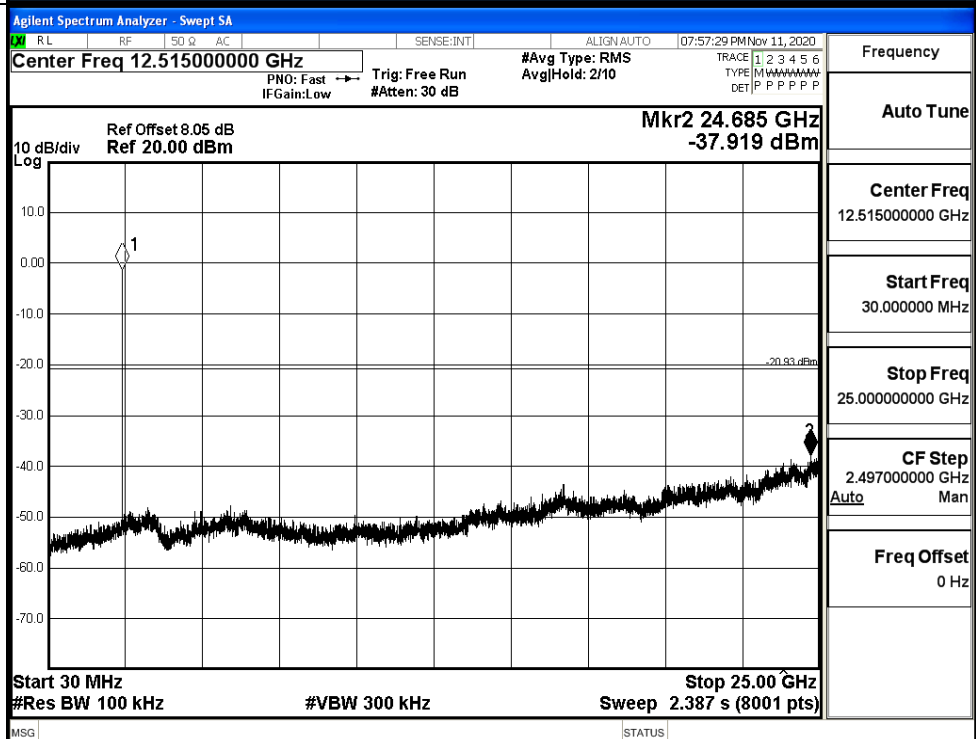


GFSK_MCH_Graphs

Pref

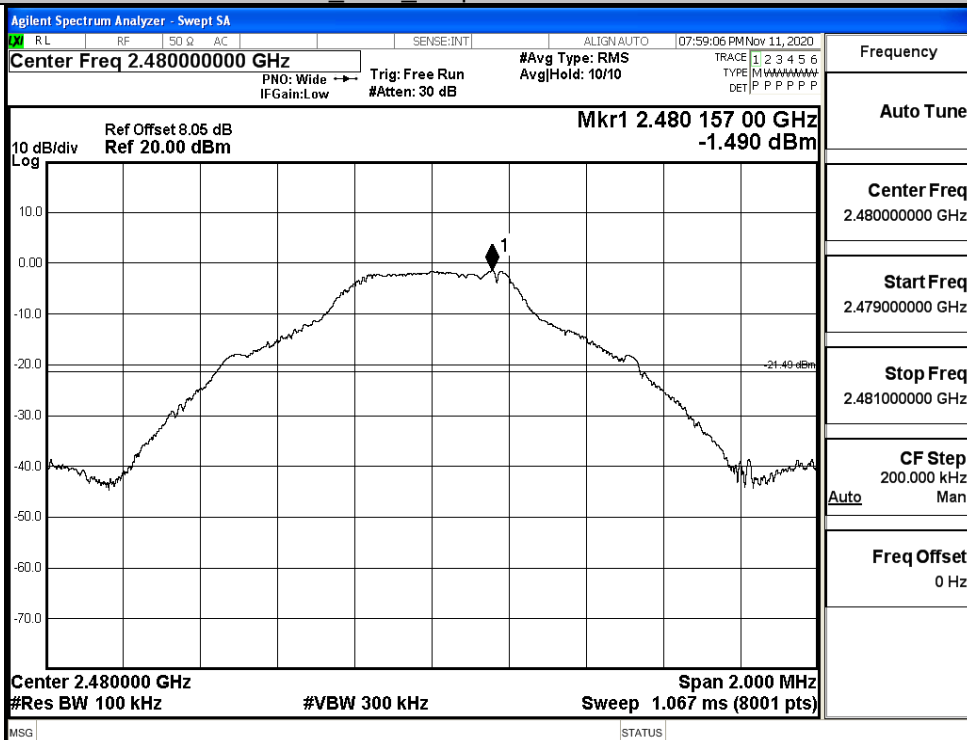


Puw

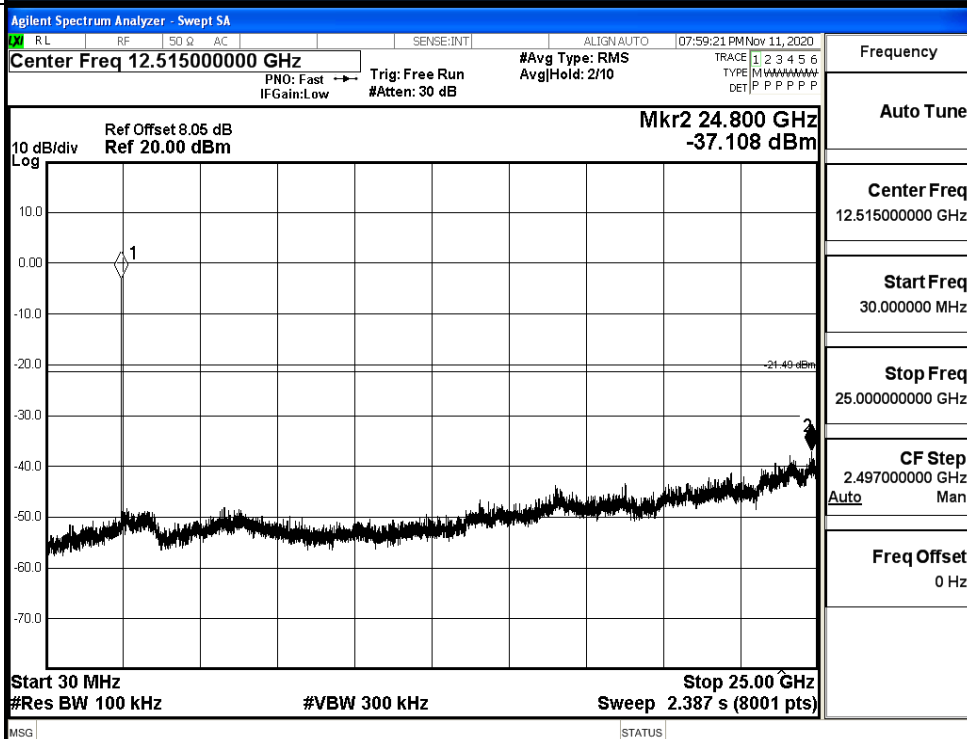


GFSK HCH Graphs

Pref

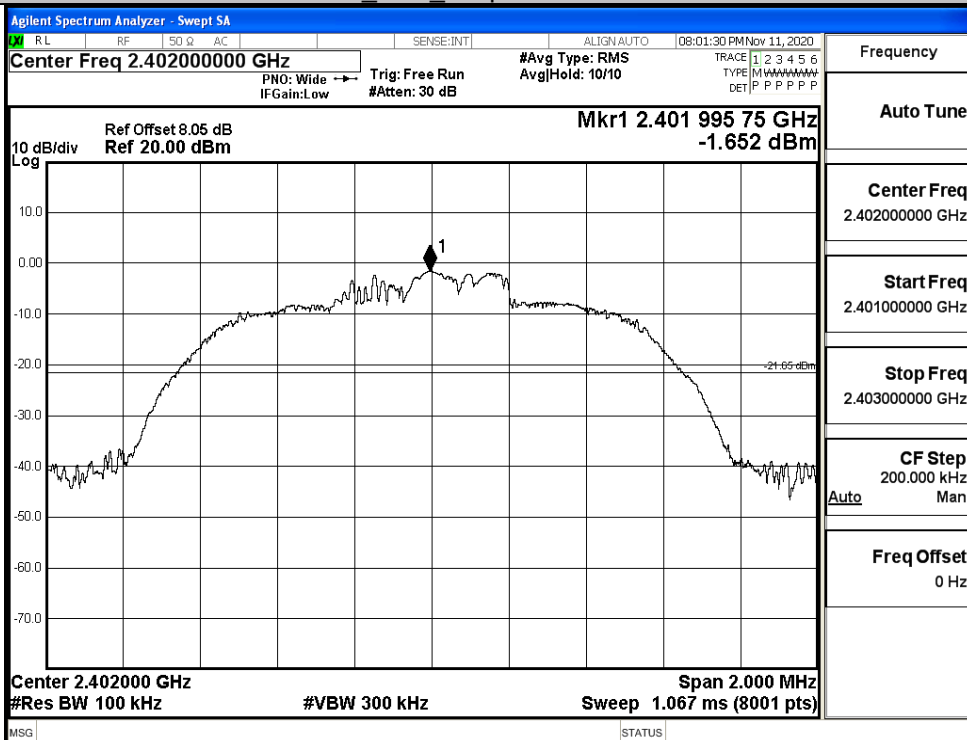


Puw

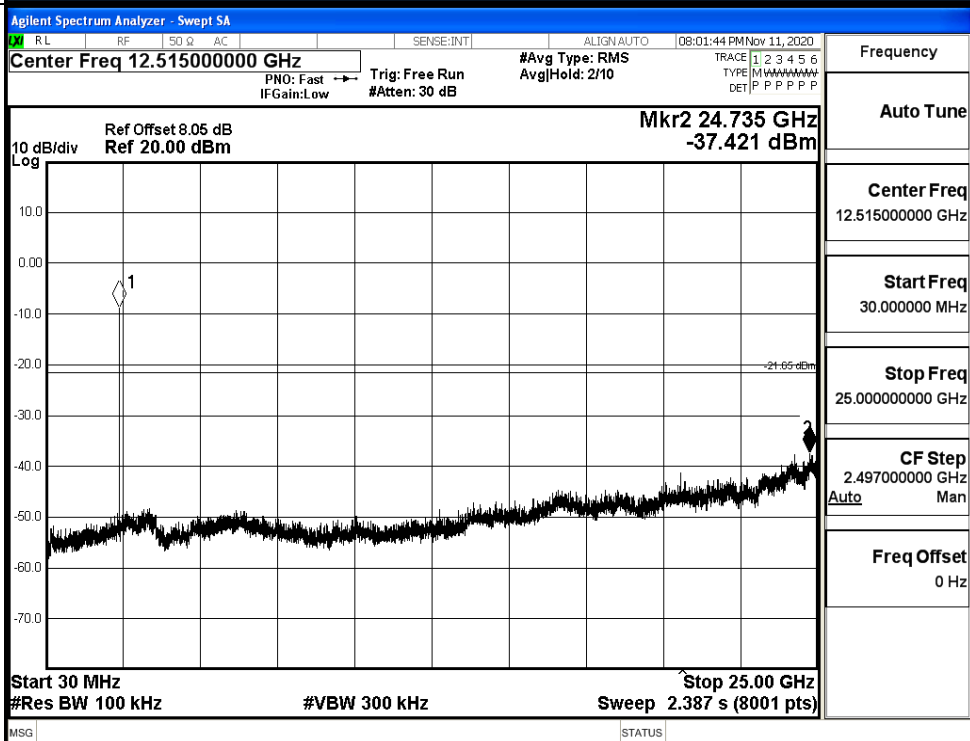


π /4DQPSK LCH_Graphs

Pref

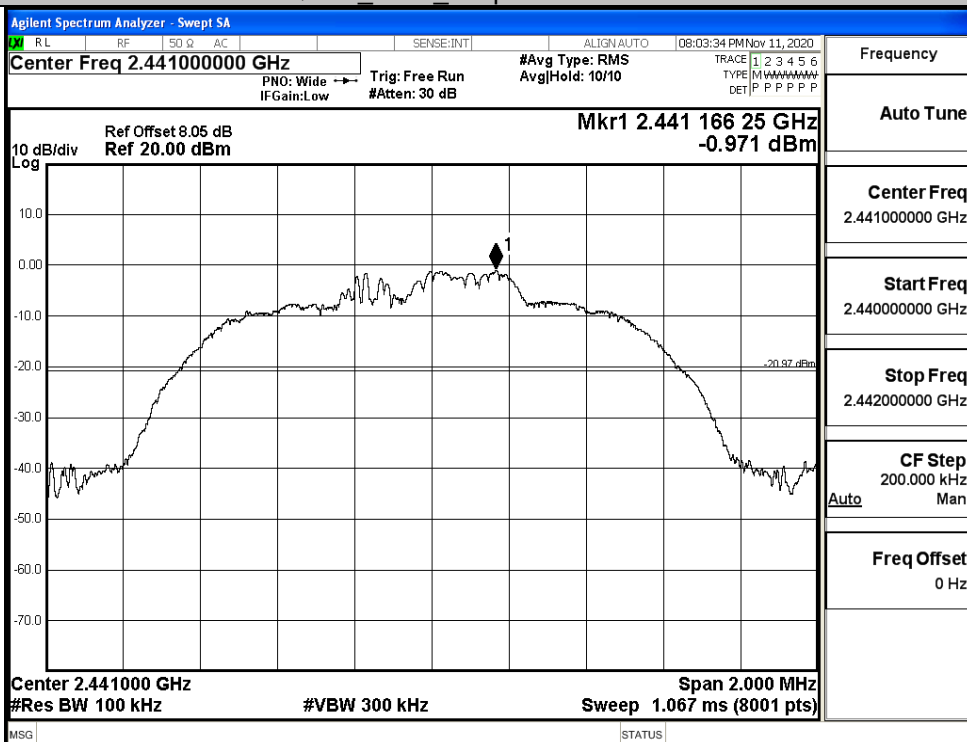


Puw

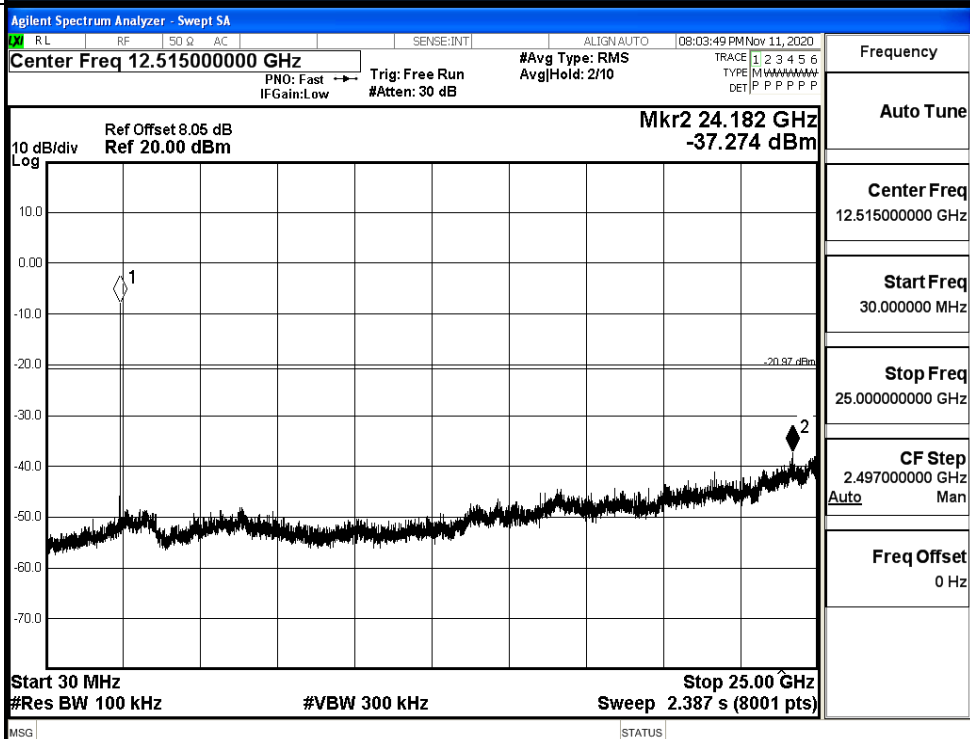


π /4DQPSK_MCH_Graphs

Pref

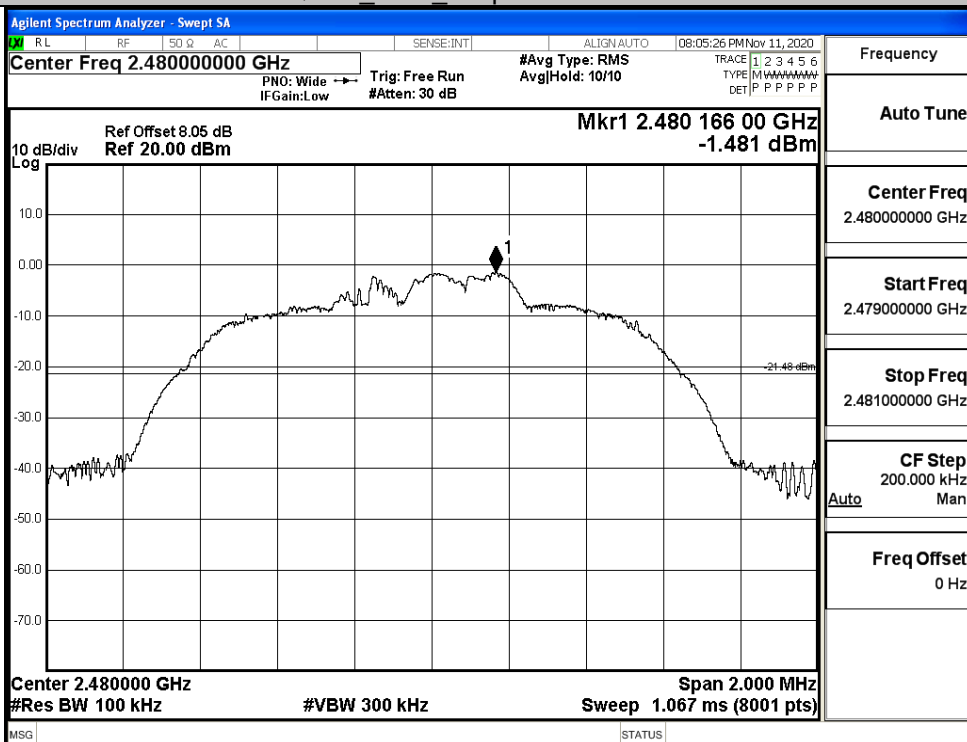


Puw

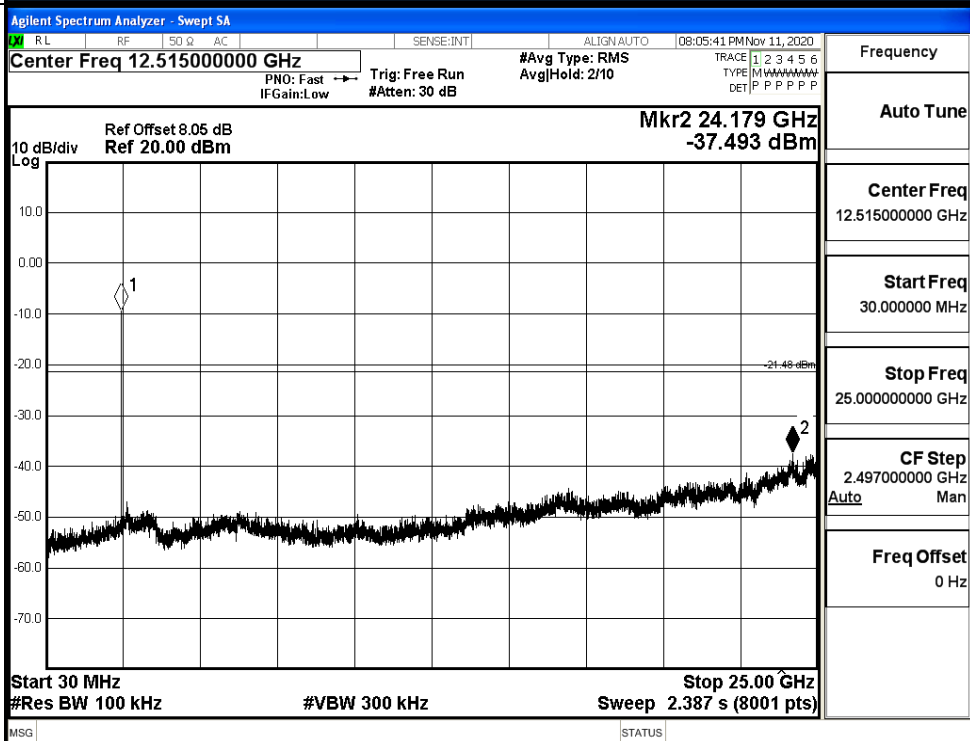


π /4DQPSK_HCH_Graphs

Pref

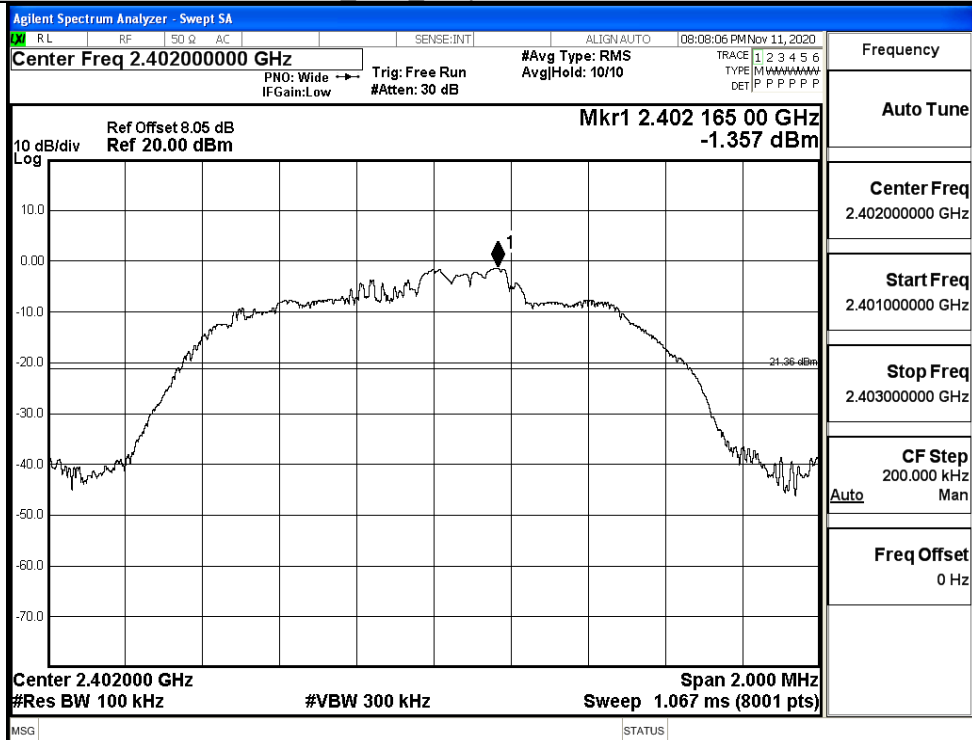


Puw

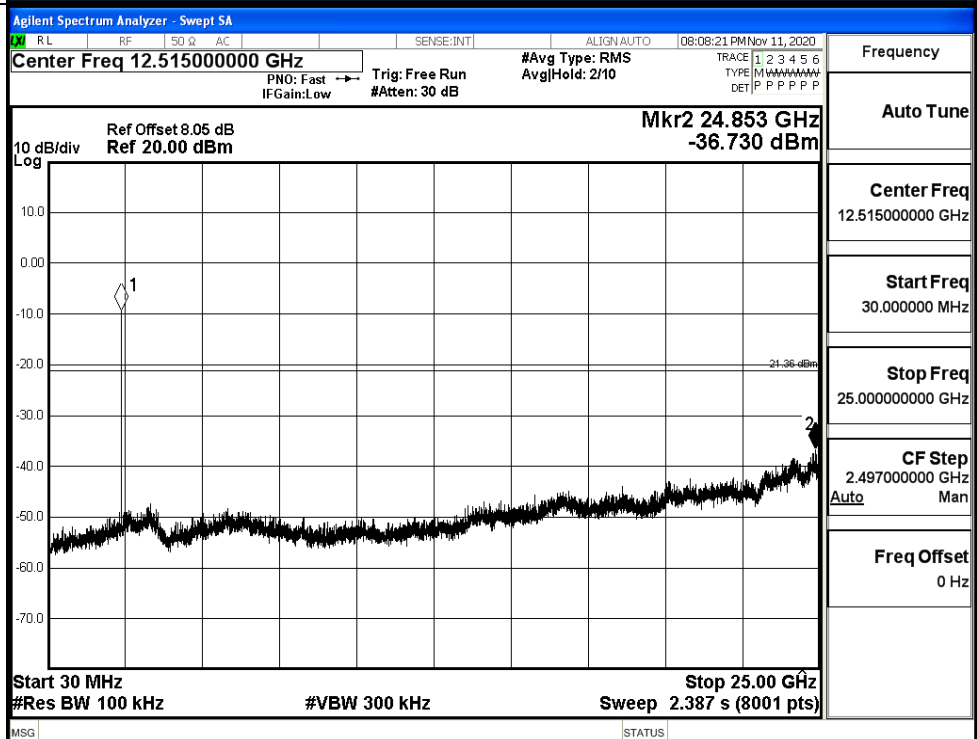


8DPSK_LCH_Graphs

Pref

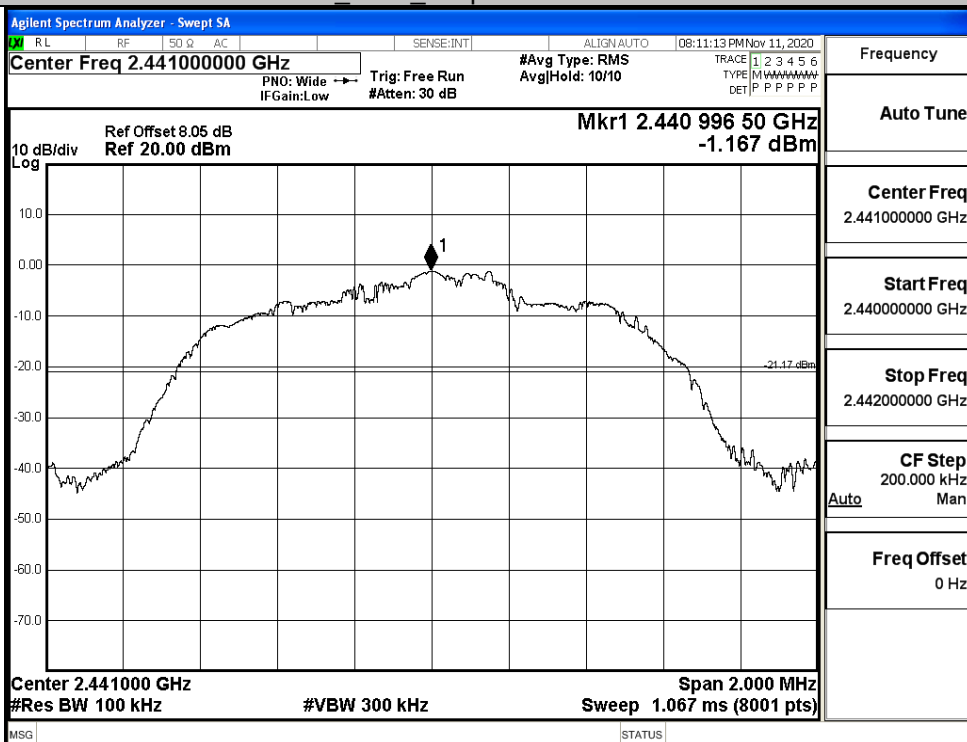


Puw

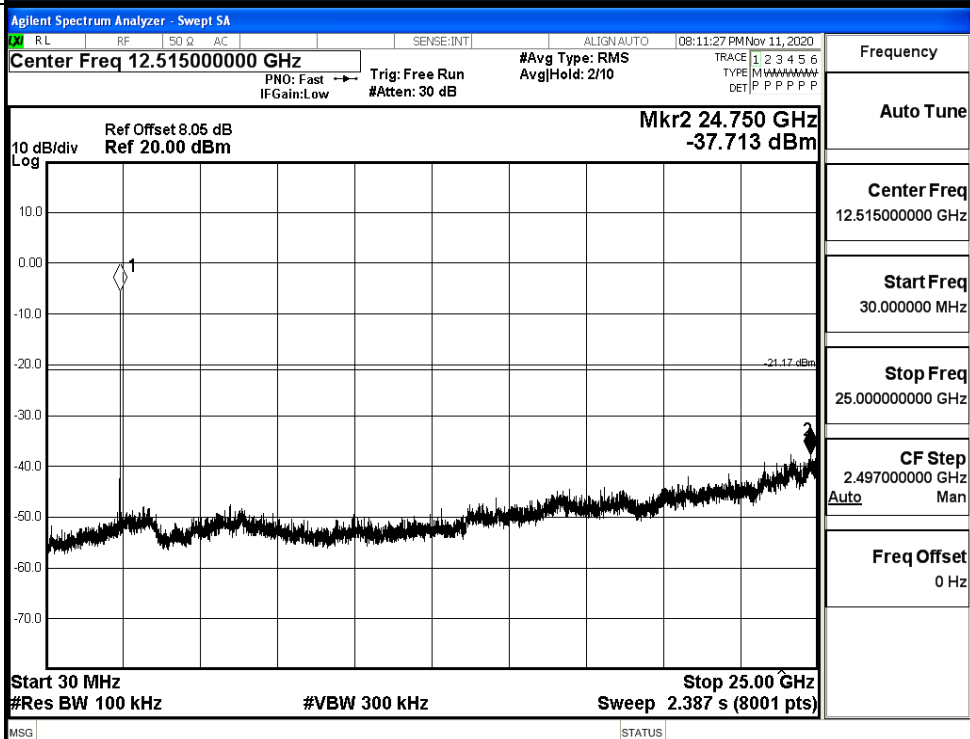


8DPSK_MCH_Graphs

Pref

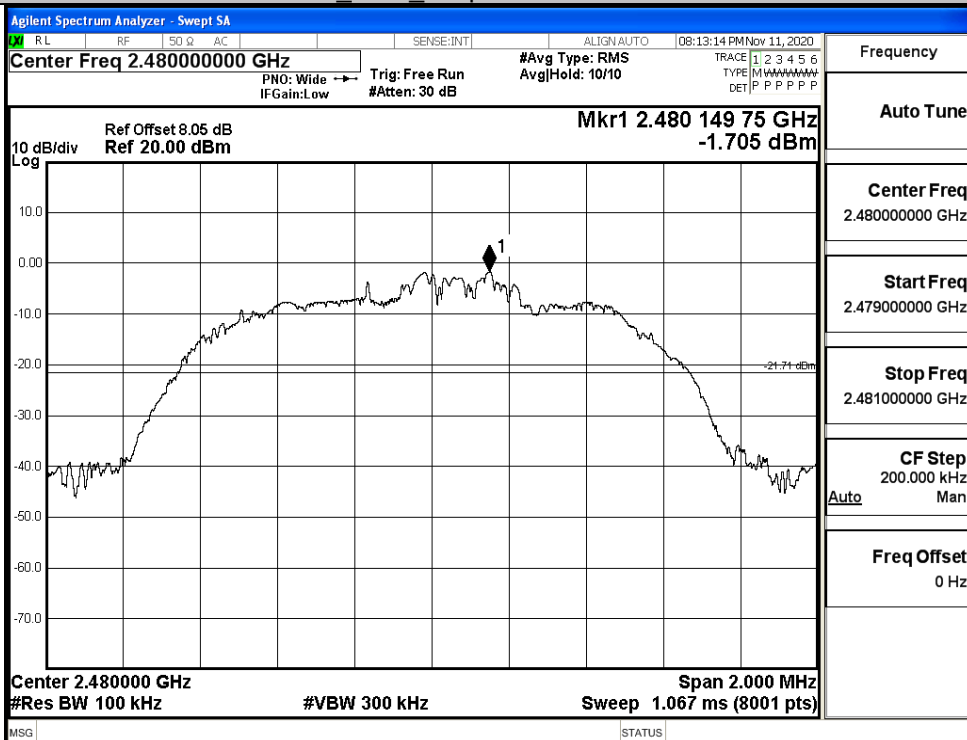


Puw

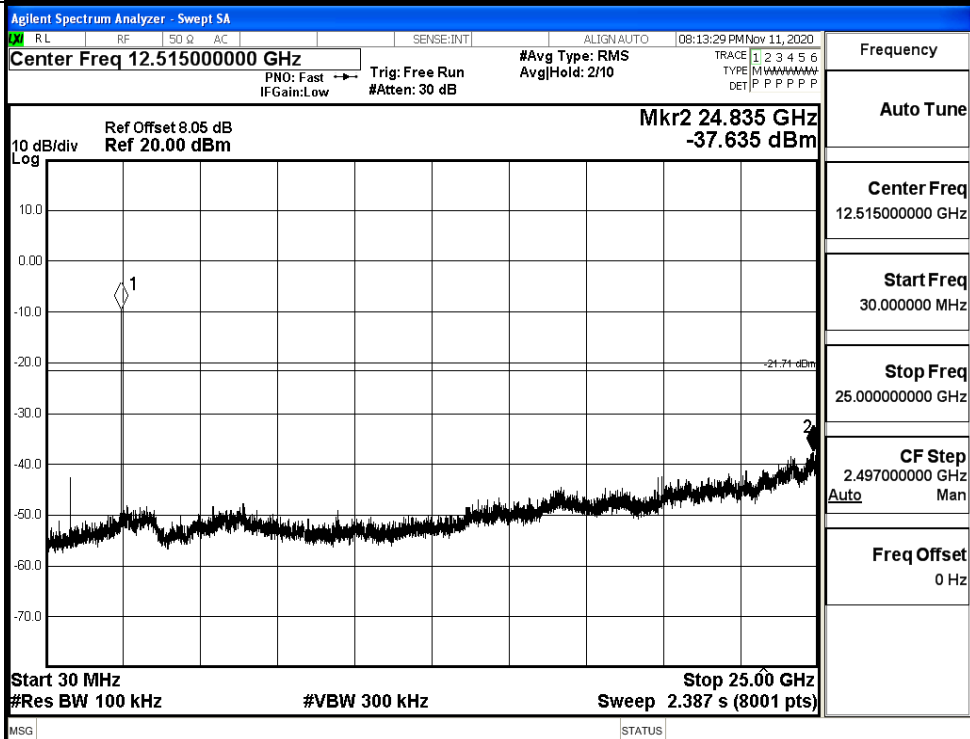


8DPSK_HCH_Graphs

Pref



Puw

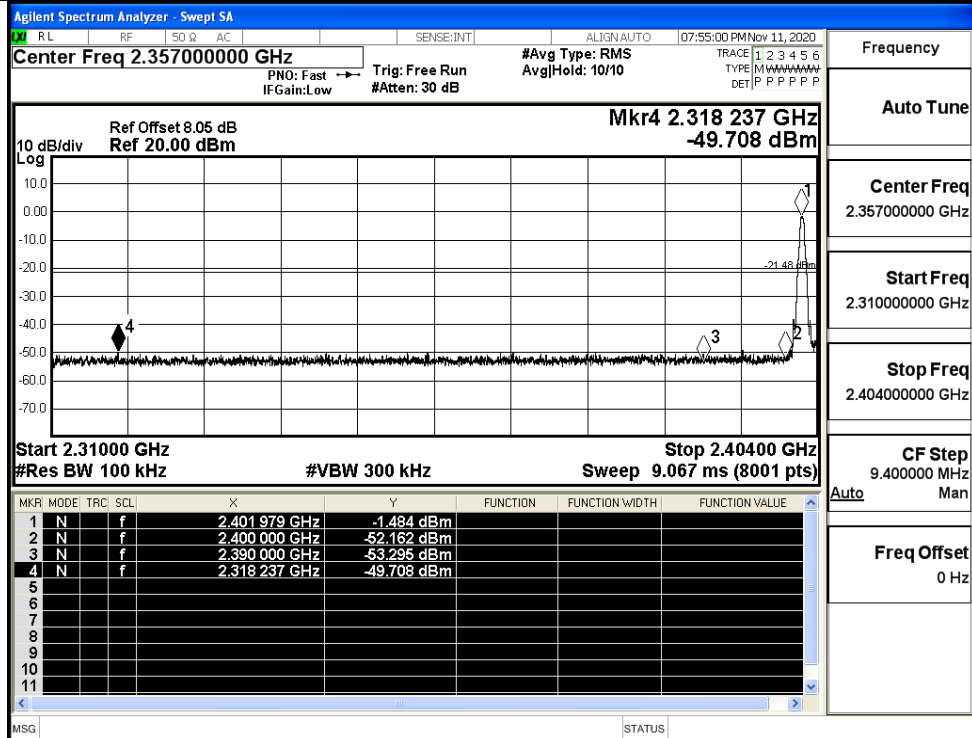


A.7 Band-edge for RF Conducted Emissions

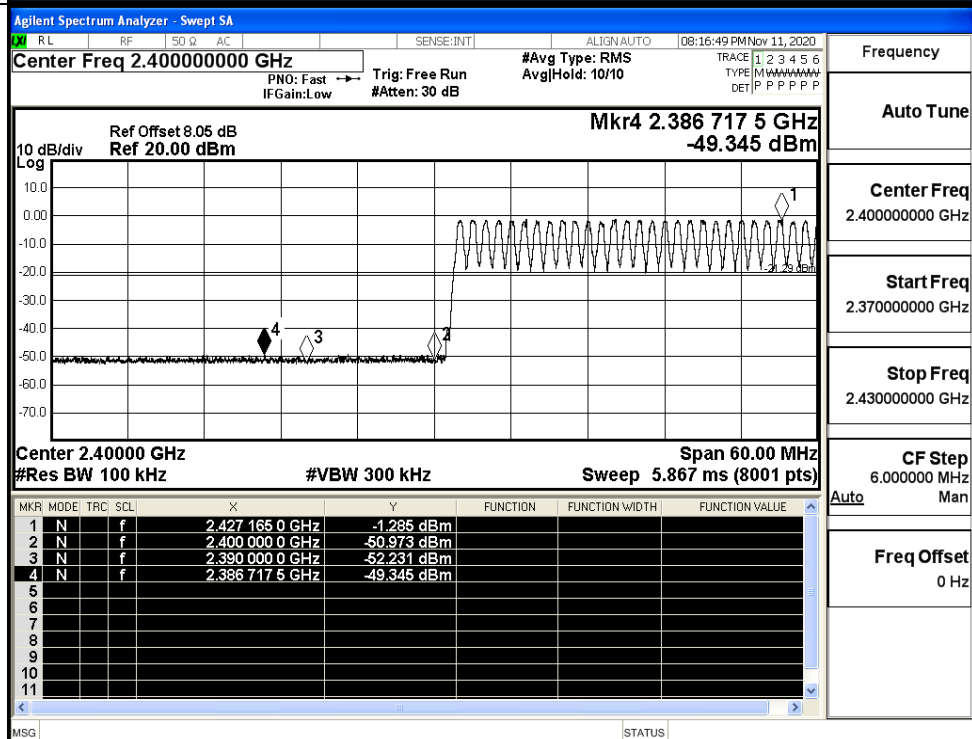
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-1.484	Off	-49.708	-21.48	PASS
			-1.285	On	-49.345	-21.29	PASS
	HCH	2480	-1.347	Off	-49.398	-21.35	PASS
			-1.202	On	-48.291	-21.2	PASS
$\pi/4$ DQPSK	LCH	2402	-1.662	Off	-49.652	-21.66	PASS
			-1.265	On	-48.425	-21.27	PASS
	HCH	2480	-1.586	Off	-49.240	-21.59	PASS
			-1.226	On	-48.439	-21.23	PASS
8DPSK	LCH	2402	-2.631	Off	-49.512	-22.63	PASS
			-1.140	On	-48.948	-21.14	PASS
	HCH	2480	-1.387	Off	-49.463	-21.39	PASS
			-1.368	On	-48.843	-21.37	PASS

Test Graphs

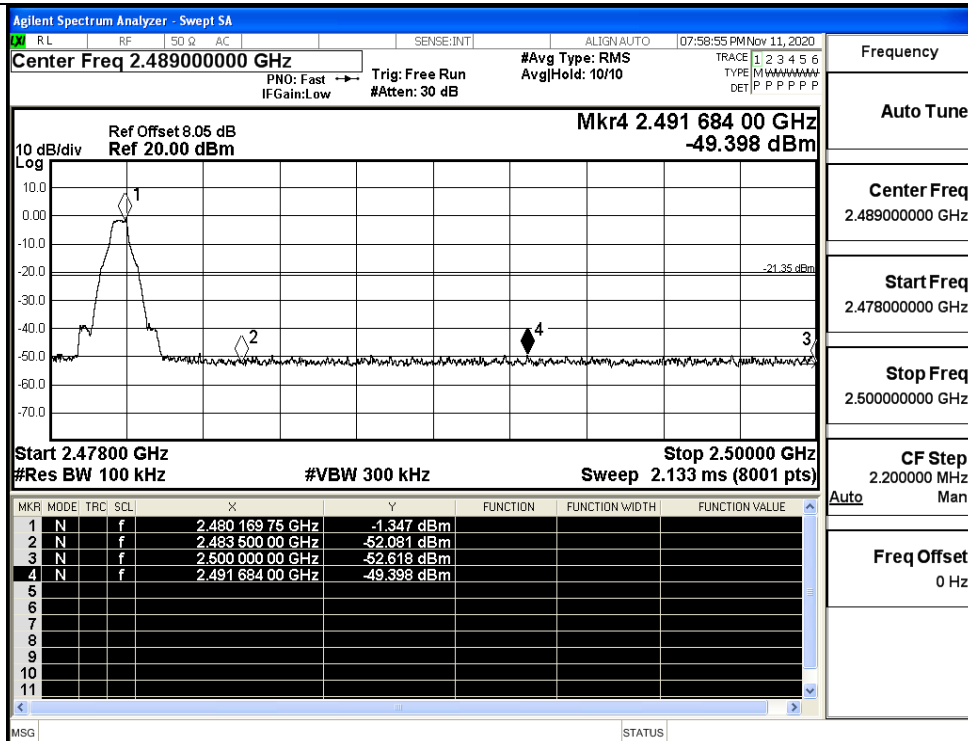
GFSK/LCH/No Hop



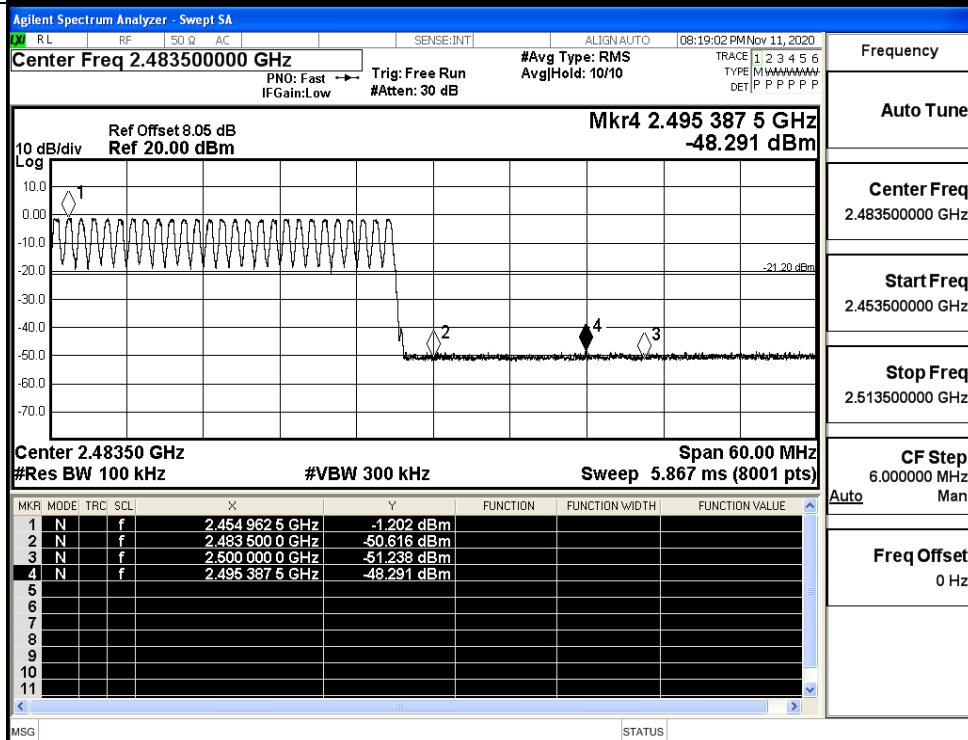
GFSK/LCH/Hop



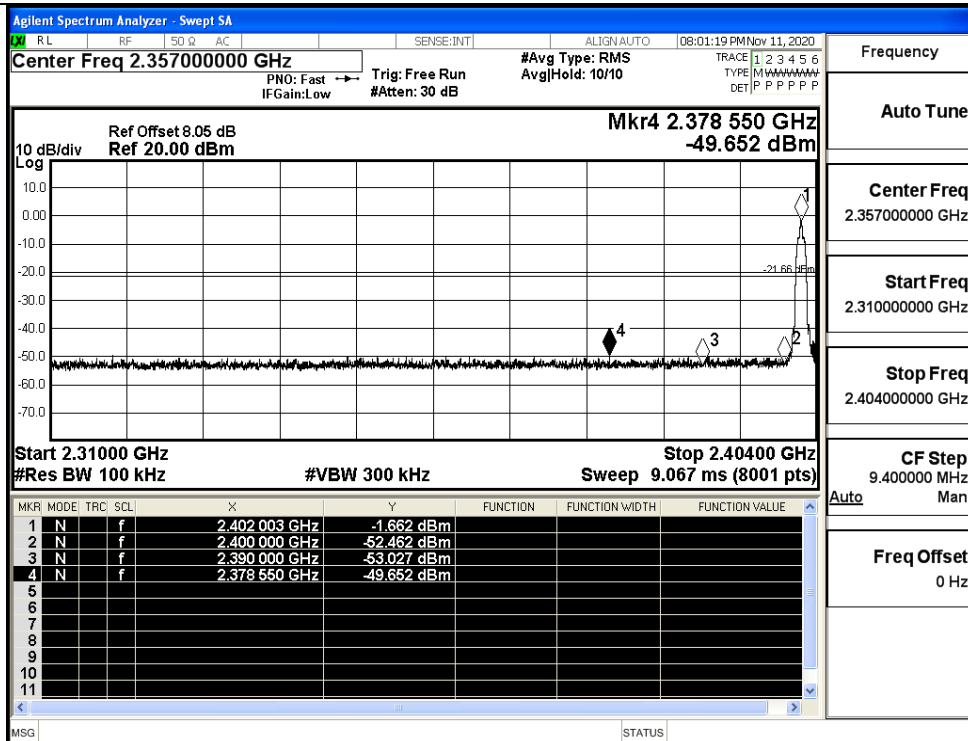
GFSK/HCH/No Hop



GFSK/HCH/Hop



$\pi/4$ DQPSK/LCH/No
Hop

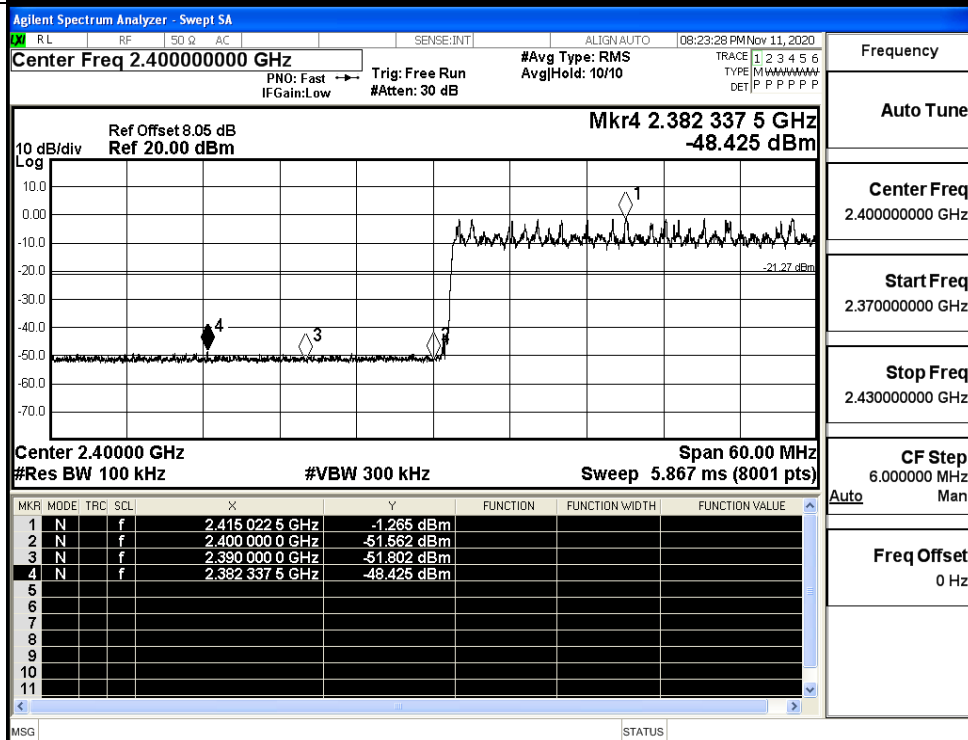


Frequency

Auto Tune

Center Freq
2.357000000 GHzStart Freq
2.310000000 GHzStop Freq
2.404000000 GHzCF Step
9.400000 MHz
Auto ManFreq Offset
0 Hz

$\pi/4$ DQPSK/LCH/Hop

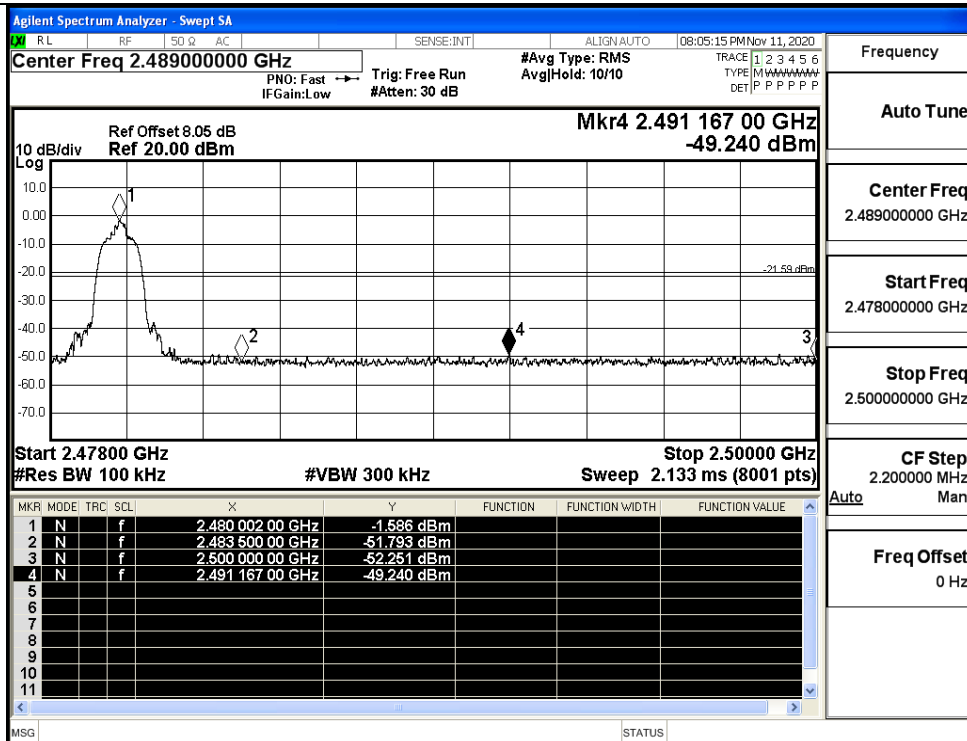


Frequency

Auto Tune

Center Freq
2.400000000 GHzStart Freq
2.370000000 GHzStop Freq
2.430000000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

$\pi/4$ DQPSK/HCH/No
Hop

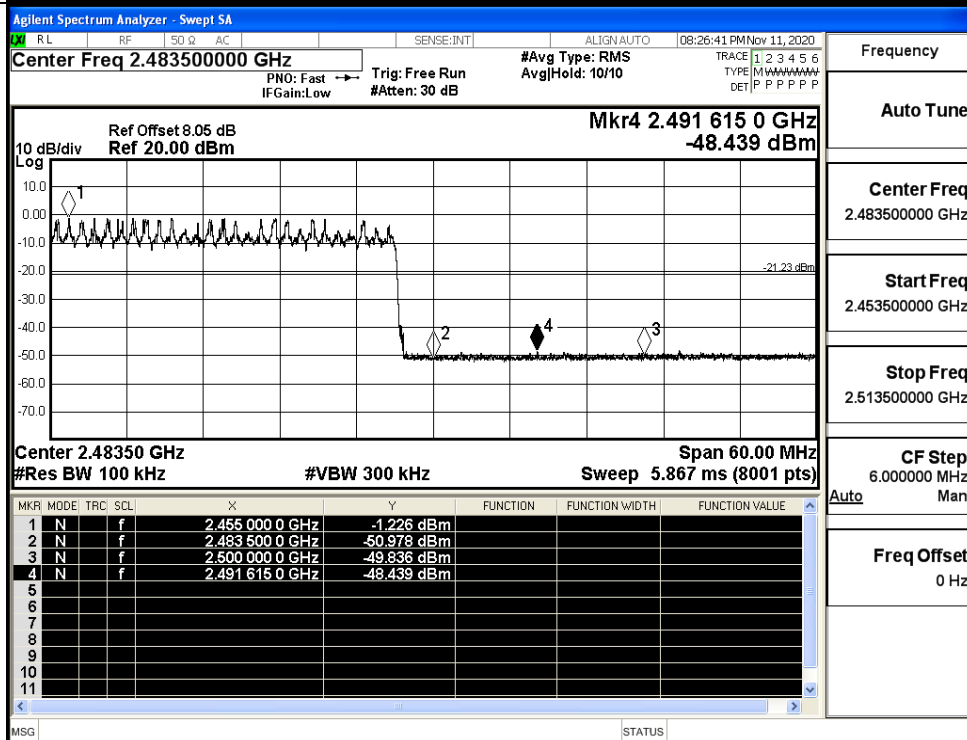


Frequency

Auto Tune

Center Freq
2.489000000 GHzStart Freq
2.478000000 GHzStop Freq
2.500000000 GHzCF Step
2.200000 MHz
Auto ManFreq Offset
0 Hz

$\pi/4$ DQPSK/HCH/Hop

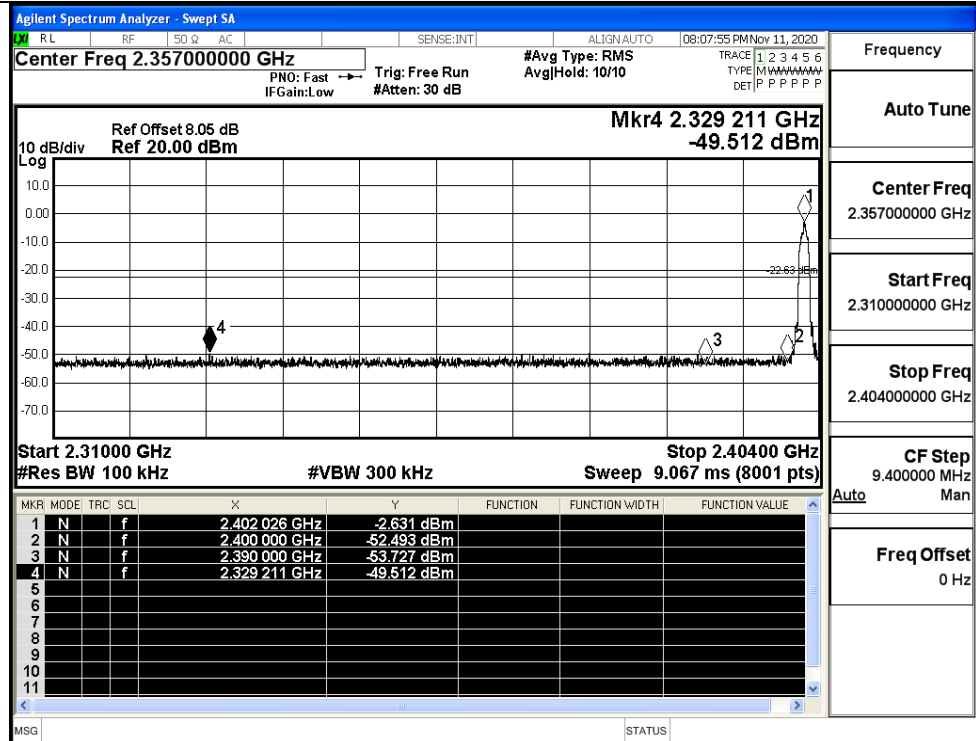


Frequency

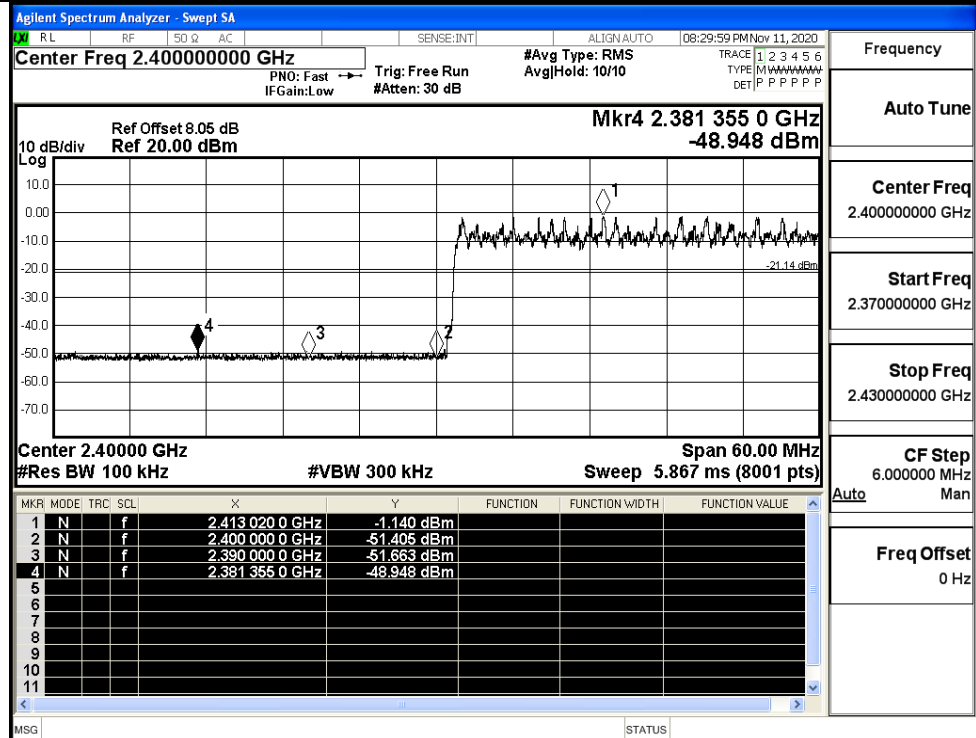
Auto Tune

Center Freq
2.483500000 GHzStart Freq
2.453500000 GHzStop Freq
2.513500000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

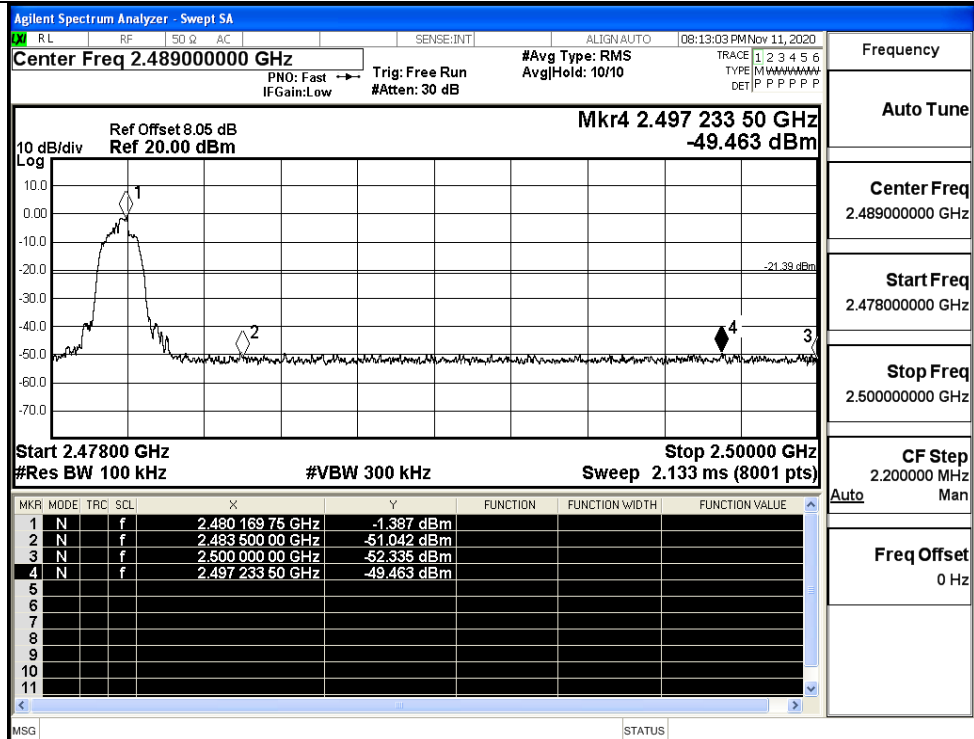
8DPSK/LCH/No Hop



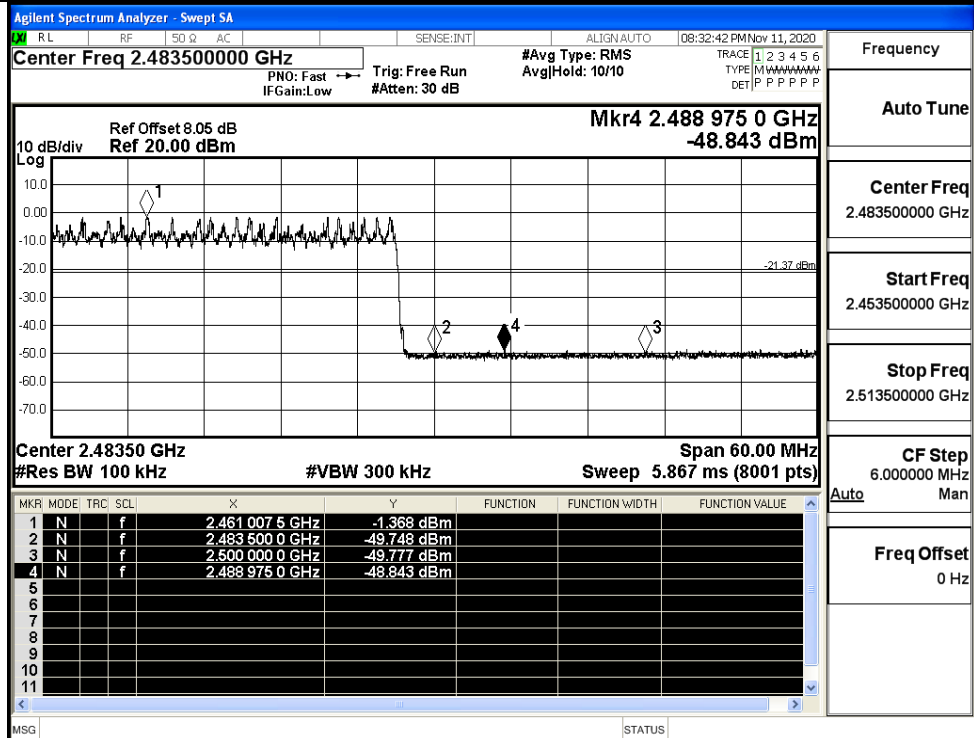
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



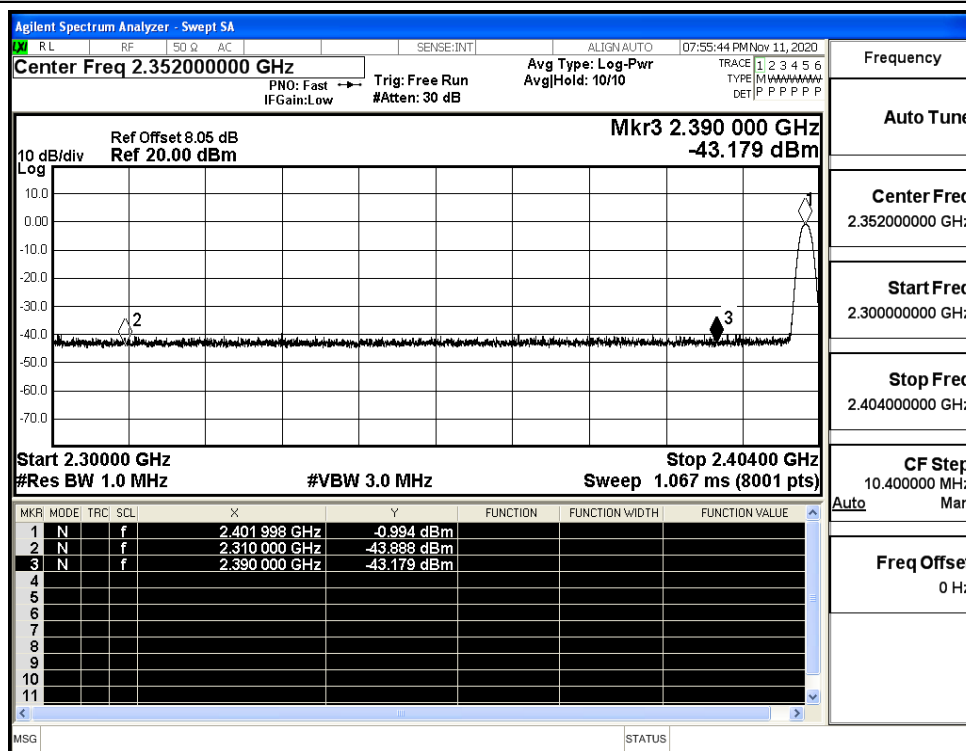
8DPSK/HCH/Hop



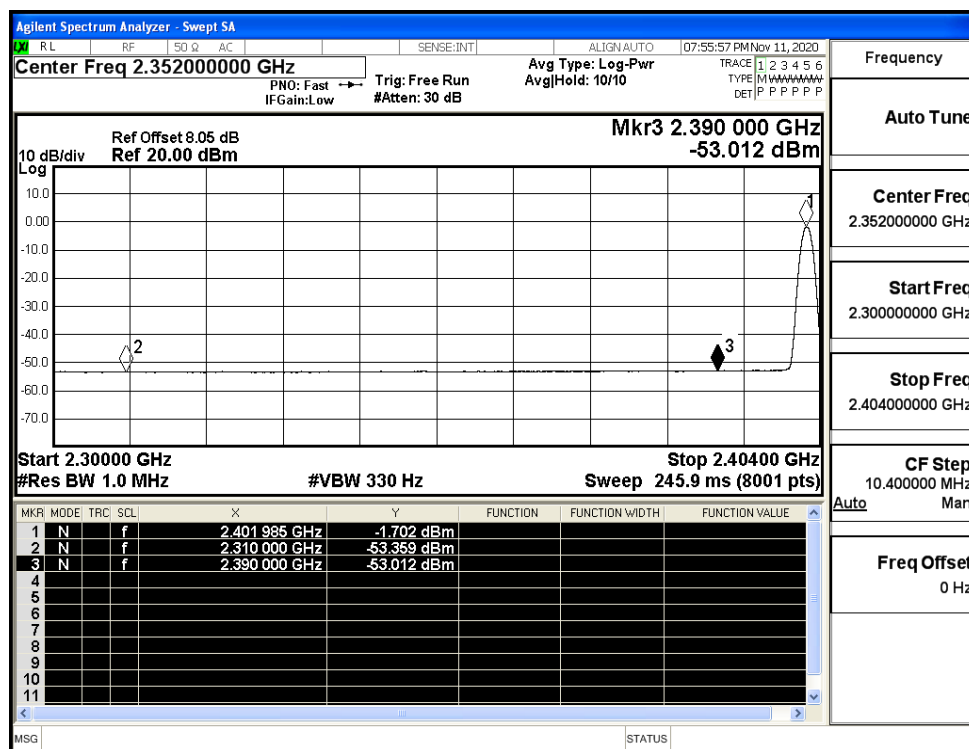
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.89	2.0	0	53.37	PEAK	74	PASS
	Off	2310.0	-53.36	2.0	0	43.90	AV	54	PASS
	Off	2390.0	-43.18	2.0	0	54.08	PEAK	74	PASS
	Off	2390.0	-53.01	2.0	0	44.25	AV	54	PASS
	Off	2483.5	-41.81	2.0	0	55.45	PEAK	74	PASS
	Off	2483.5	-52.24	2.0	0	45.02	AV	54	PASS
	Off	2500.0	-43.02	2.0	0	54.24	PEAK	74	PASS
	Off	2500.0	-52.41	2.0	0	44.85	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.86	2.0	0	54.40	PEAK	74	PASS
	Off	2310.0	-53.47	2.0	0	43.79	AV	54	PASS
	Off	2390.0	-43.54	2.0	0	53.71	PEAK	74	PASS
	Off	2390.0	-52.87	2.0	0	44.39	AV	54	PASS
	Off	2483.5	-41.83	2.0	0	55.43	PEAK	74	PASS
	Off	2483.5	-52.45	2.0	0	44.80	AV	54	PASS
	Off	2500.0	-41.31	2.0	0	55.94	PEAK	74	PASS
	Off	2500.0	-52.34	2.0	0	44.92	AV	54	PASS
8DPSK	Off	2310.0	-41.76	2.0	0	55.50	PEAK	74	PASS
	Off	2310.0	-53.41	2.0	0	43.85	AV	54	PASS
	Off	2390.0	-43.59	2.0	0	53.67	PEAK	74	PASS
	Off	2390.0	-53.05	2.0	0	44.21	AV	54	PASS
	Off	2483.5	-42.14	2.0	0	55.12	PEAK	74	PASS
	Off	2483.5	-52.43	2.0	0	44.83	AV	54	PASS
	Off	2500.0	-41.57	2.0	0	55.69	PEAK	74	PASS
	Off	2500.0	-52.30	2.0	0	44.96	AV	54	PASS

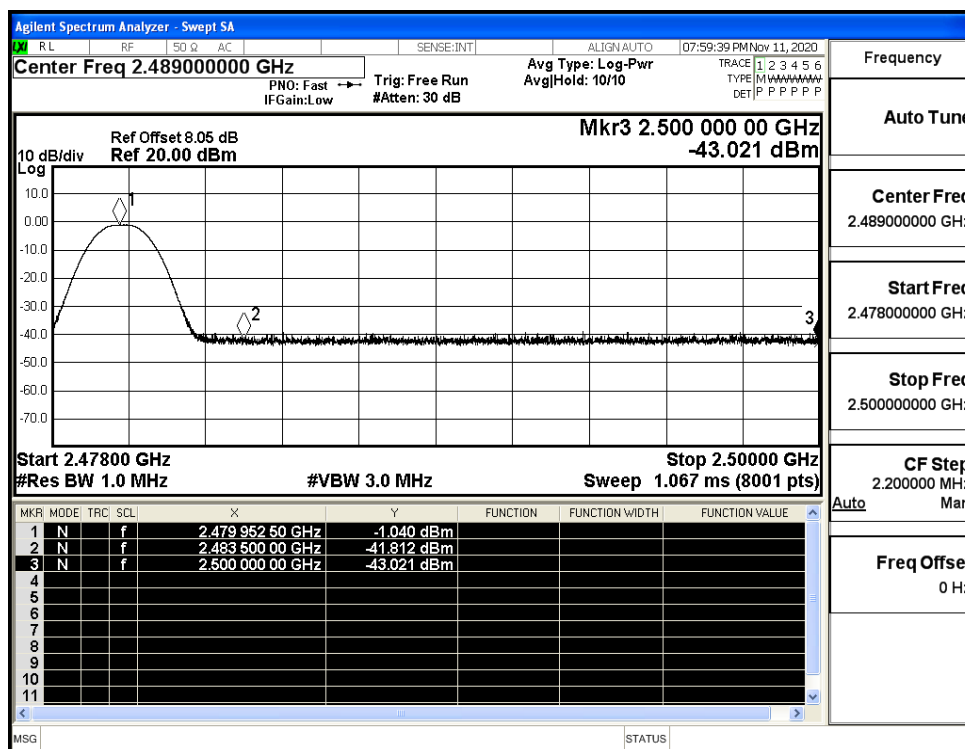
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



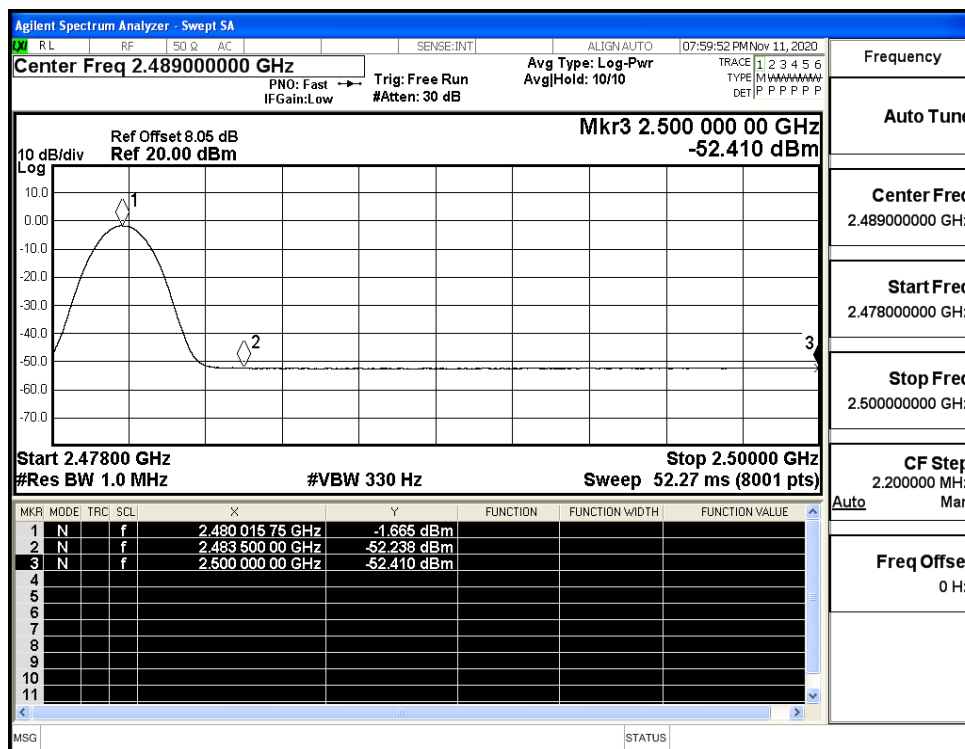
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

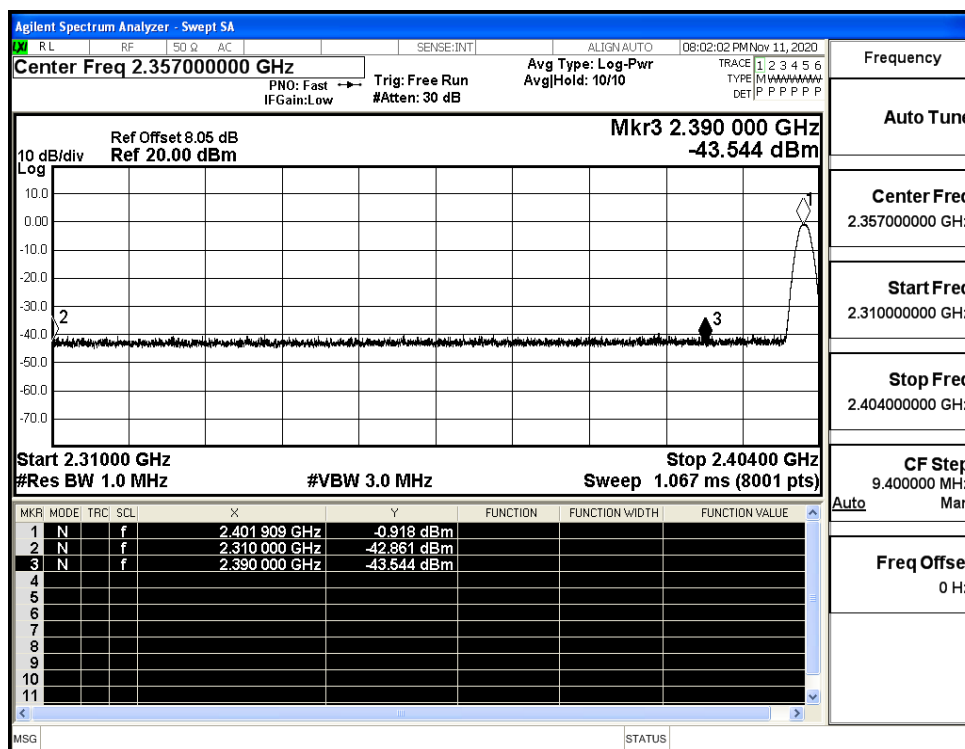
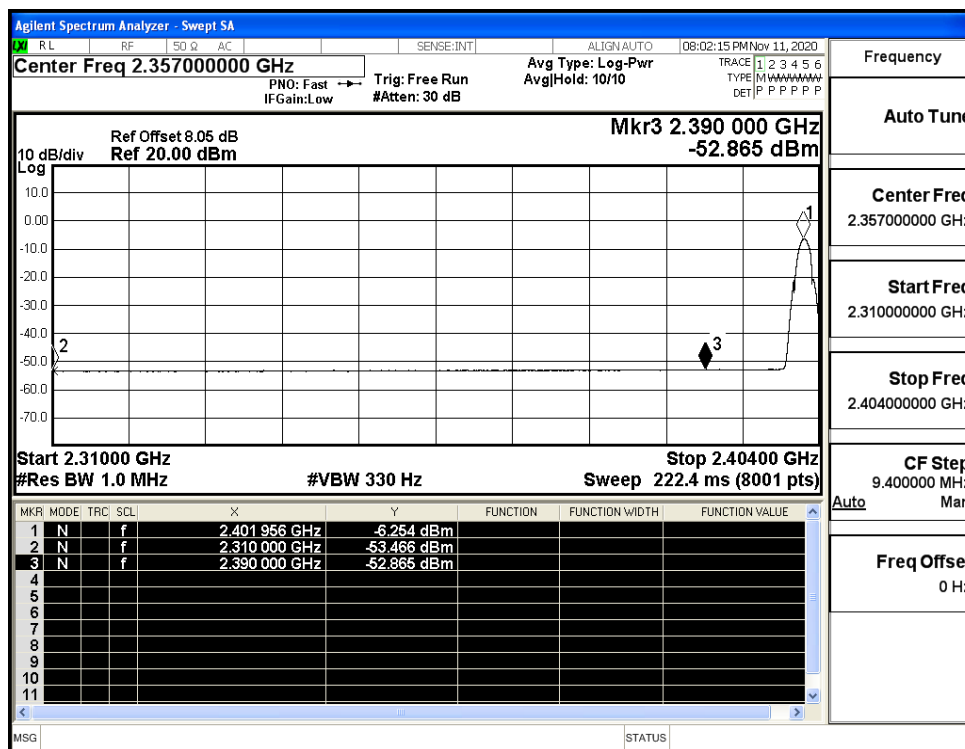


Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)

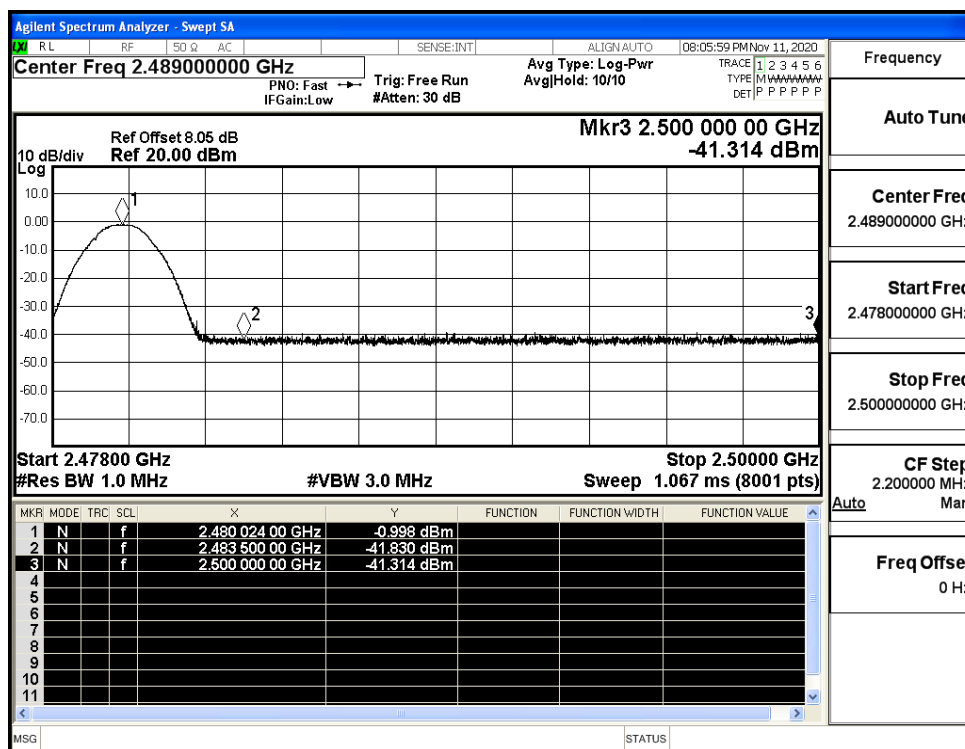


Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)

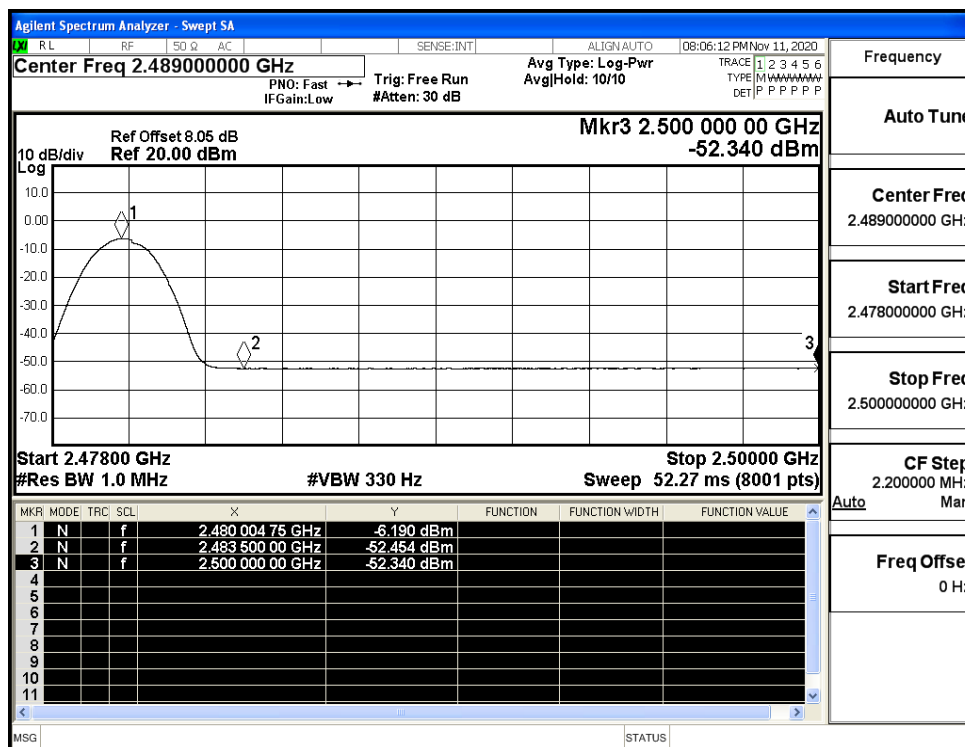


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

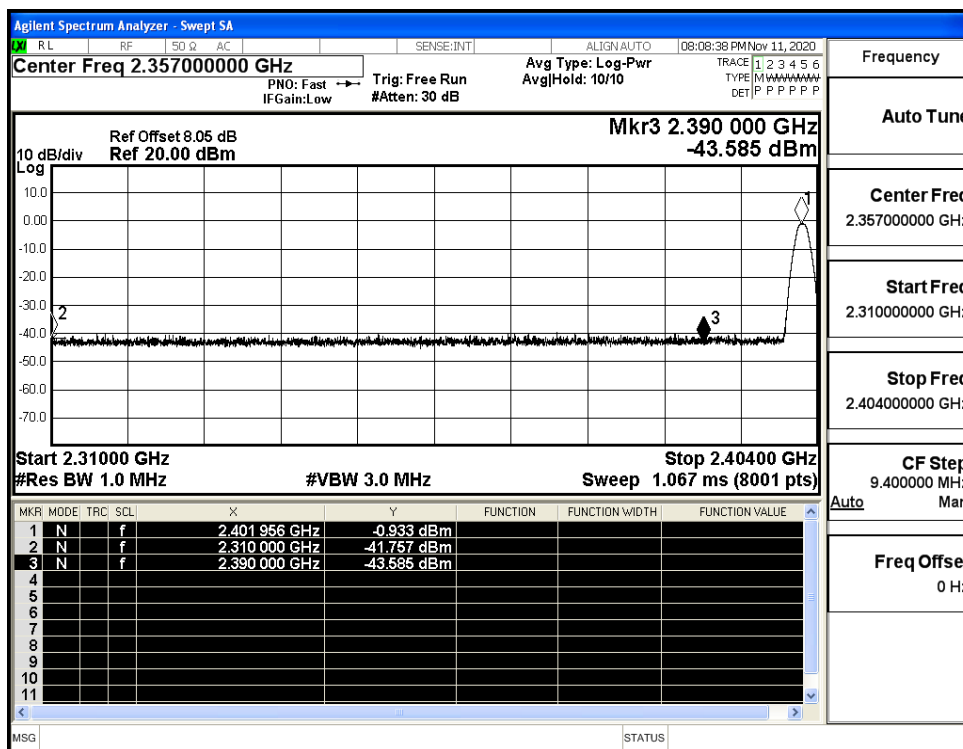
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



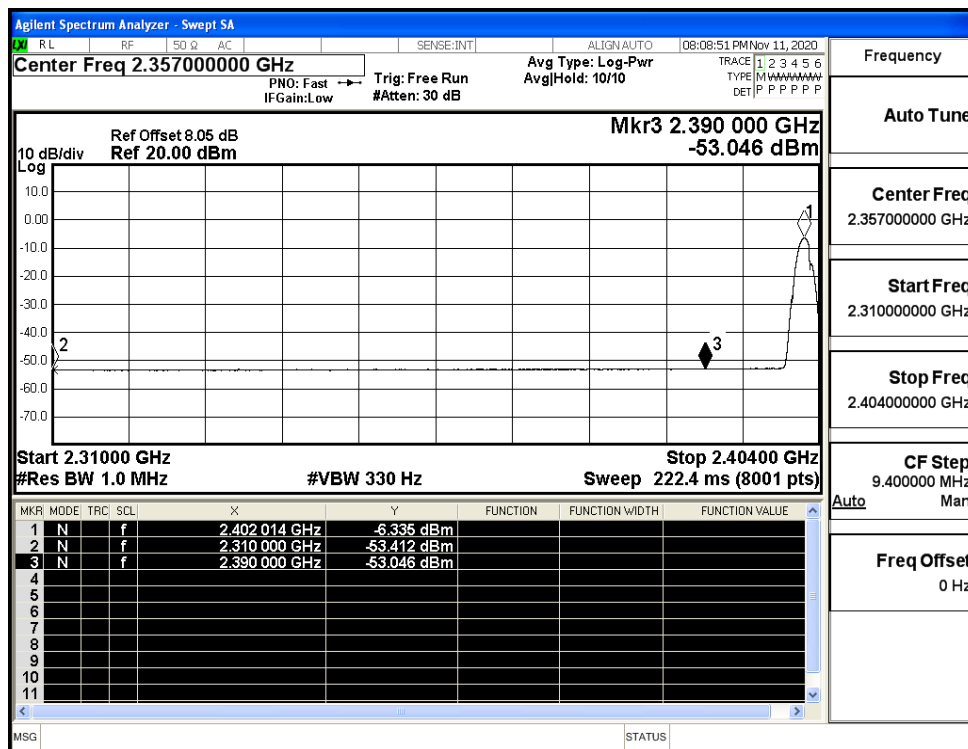
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



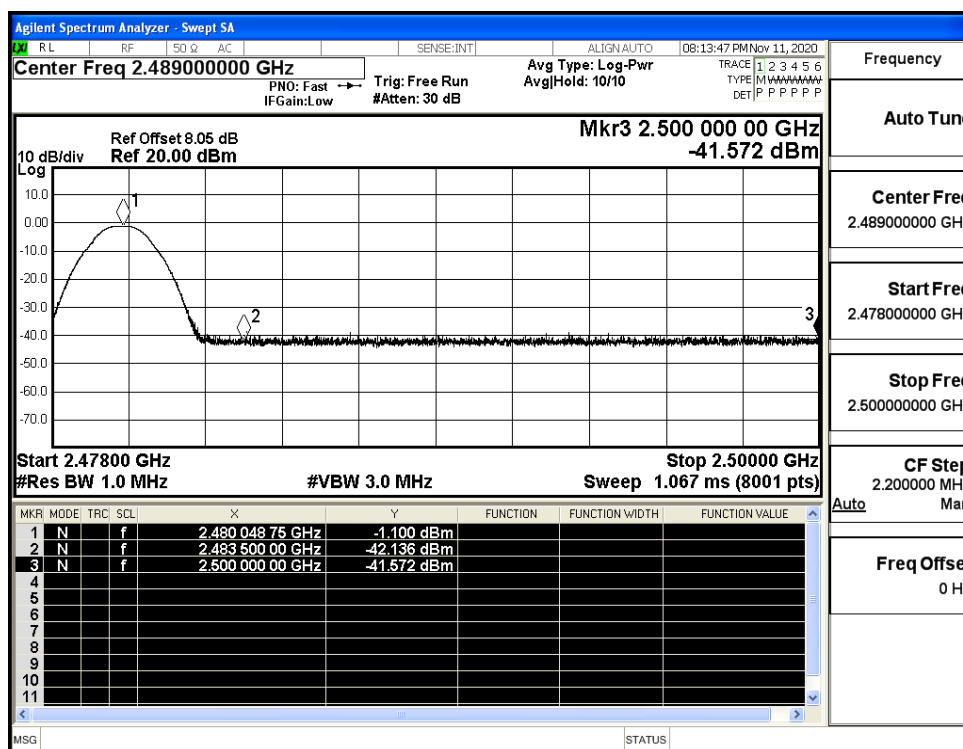
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (High Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (High Channel)

